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Electrical World

New York, September 29, 1917 McGraw-Hill Publishing Co., Inc. Vol. 70, No. 13 10c a copy

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Electrical World

The consolidation of ELECTRICAL WORLD, ELECTRICAL ENGINEER and AMERICAN ELECTRICIAN
Published by the McGraw-Hill Publishing Company, Inc.

Vol. 70 NEW YORK, SATURDAY, SEPTEMBER 29, 1917 No. 13

The Ethics of Price Raising

WE HAVE spoken in strong terms several times of late concerning the burdens imposed on central stations by increased costs, and have held consistently to the view that wherever real hardship was inflicted upon the company a remedy was at hand. Application to the proper authorities for the right of raising the price of the product has in numerous instances brought relief. We note with interest, however, that twice recently there have been attempts on the part of the organized central stations of some particular jurisdiction to seek from the public authorities blanket permission for a general, though not considerable, rise in the schedule. In both cases the commissions denied the request without prejudice to the rights of individual companies to ask in their own behalf for help. Such a treatment of the matter may be disappointing to some of the petitioners, but it is sound ethics nevertheless. The burden of extra costs does not fall with equal severity on all the central stations of a single state. It may be true that all stations have ground for complaint, but not in equal amount. Where a supply company is so situated that the coal shortage affects it very severely, or where its territory of service is so great as to impose an extraordinary burden of labor, there is just cause for expecting a commensurate measure of relief, which may be greater or less than will be equitable in the case of another company within the same general territory.

This seems to have been the view that commissions have taken, and it is one that is likely to be followed in other instances. A systematic reckoning by all stations of their increased costs and the distribution of them should be made to serve as a basis for suitable claims in the matter of increased rates. Very important information can thus be placed at the disposal of the various commissions, on which they can base a fair judgment as to the future of the schedule. But such co-operative effort on the part of the stations evidently cannot wisely go to the extent of a general plea for increases. The rights of the matter are to be determined in each individual case, and the indications so far are that they will be so determined and the necessary relief will be secured. The main point which the company in trouble should consistently keep in mind is that commissions are designed to protect the rights of all the people, investors as well as customers. It is of no use to plead the condition of war as a reason for charging what the traffic will bear. That procedure has been followed in too many instances, quite aside from the electrical business, to make it popular or successful. A company that has through various stages merged itself into sorry over-capitalization must be extremely cautious in setting up its claims, and is liable to raise uncomfortable queries as to the actual cash invested on which a due return is claimed. In the vast majority of instances, however, the concern that finds itself hard pushed and goes to the commission to spread the cards upon the table is likely to win rather than to lose, as numerous instances throughout the country show. We reiterate therefore our advice to those who are overburdened frankly to ask for help in a situation which is likely to be more trying rather than less as time goes on.

The Penalty of Sloth

OVER and over again we have dinned into the ears of the public the almost criminal negligence of permitting the water powers of the country to remain unutilized in face of the crying needs of industry and the certainty that the nation's supply of fuel must be conserved. And yet, despite the absolute certainty that unused water represents an irremediable loss of energy, in spite of steadily rising costs of fuel and of everything in which fuel prices figure, the legislative authorities have dawdled along, pulled one way and another by contrary currents of politics, beset by the pleadings of general interests, of special interests and no interests at all, until the time has come when the penalty of delay is enforced by fate against the unready. It is difficult to speak with patience of the many attempts which have been made to obtain opportunity to develop water powers on a fair and permanent basis; and now the country needs the power, the mines are short of labor, the railroads are gorged with traffic, the coastwise shipping has been drafted into transatlantic service, and industrial plants already are beginning to shut down for lack of fuel.

The full development of the country's hydraulic resources cannot supersede in any full sense the use of fuel, but it can prevent the shortage of fuel being disastrously felt even in time of stress like this. The long and short of the matter is that war conditions have forced upon us a fuel situation which normally might not have been reached for a couple of centuries, and absolutely nothing is being done as yet to put an end to the water-power deadlock. This deadlock is largely due to timid Congressmen whose socialistically inclined constituents are terrified by the bogy man of monopoly shaken in their faces by demagogues. There is no such thing possible as monopoly of water power under the powers of regulation possessed by our government. There has been plenty of capital all along ready to go into any transmission enterprise that prom-

ised reasonable profit, asking only that some tenure of life should be granted to its efforts, and that it should not at the end of a few years be robbed of the results of its endeavor. All these things ought to be sufficiently self-evident to those who have watched the progress of the attempts at water-power legislation. Everything has been held up by unreasonable and indefensible projects of regulation so drastic in their nature as to frighten off any sane investor. Millions upon millions of horsepower therefore stay unutilized. The time has come when the country wants them.

The next year will probably see these United States transformed into a prodigious munitions plant, and every branch of industry which can tend to successful carrying on of the war now in hand must be pushed to its utmost capacity. At such a crisis it is not pleasant to find the Niagara power tied up, largely for sentimental reasons, by needless restrictions and to realize that at any time Canada, also busy with war industries, may stop the exportation of its Niagara power. If inaction continues much longer, the natural result will be to drive the large power-consuming industries, particularly the electrochemical ones, into Canadian territory, where they may by chance find a kinder welcome than has been extended to them on the American side of the falls. The grimmest thing about the whole situation is that it has developed so swiftly as to give no time even for the most willing efforts to furnish prompt relief. It is no quick or easy job to bring a hydroelectric plant of 100,000 hp. or so into productive activity, and time is the one thing which money cannot buy. There is chatter in newspapers about the conservation of coal and oil. No single stroke would have gone so far toward bringing this about as a proper hydroelectric law enacted two years or more ago. It is already far too late to reap in time for the exigencies of war industries the full advantage which the country has in its water powers. The most that can be hoped for now is that if Congress gives relief swiftly some substantial portion of the work may be accomplished let us say within the next year, in time for the succeeding campaigns. Of the other millions of available horsepower, some are beyond hope of quick redemption and others can be brought into action in two or three years. Rapid and complete development of everything capable of it is the first and immediate step to be taken, leaving the fuller working up of the situation for later efforts. Another six months will show with terrible force the foolishness of delays in the past. Let us have no more of them.

Treating Wooden Poles

THE discussion by Herbert W. Meyer of this very important subject is based on the inspection and study of a distribution system containing 20,000 poles, and is therefore of exceptional interest because of the large number of observations from which average conditions may be judged. Poles decay from an onslaught of what are practically micro-organisms which infect the wood and break down its cellular structure. The object of treating is in the main to kill these invaders and to render the wood immune to their attacks by saturating it with a substance deadly to them. This preservative is sometimes applied by a tank treatment of a more or less thorough character, sometimes laid on with a brush. Mr. Meyer's data cover not only the untreated poles but those treated by both these methods. The facts gathered in the article indicate that a thorough brush treatment actually does, in the locality considered, lengthen the life of a pole by about a third. On the other hand, there is good reason to believe that poles treated in an open tank will last twice as long as those brush-treated. The difference in cost found by Mr. Meyer amounts to only $1.10 in a little more than $20. The extra expense of the tank treatment is therefore money exceedingly well spent.

The A. I. E. E. and Industrial Research

THE world war has made evident to all the nations as never before the vital economic importance of industrial research and of the application of science to manufacture. In several of the Entente countries manufacture was carried on, here and there, by pure rule of thumb. In factories of that type the leaders were often men of considerable experience and ability but without any technical scientific training. It was natural in many cases that such leaders should be jealous of attempts at interference by well-meaning scientific experts, who, with relatively small industrial experience, sought to devise experimental improvements in long-established processes. Why should such costly and inexperienced meddlers be allowed to interfere with the regular work of production? The result was that when technically trained Germans began to make improvements in manufacture by painstaking investigations the rule-of-thumb factories had to let go the production of the newly improved material and concentrate work in other departments not yet encroached upon. It was so much cheaper to go on manufacturing in the well-known time-honored ways and let some one else pay the expense of researches, which, after all, might not be successful.

The enormous expansion of manufacturing production in Germany during the last twenty years was partly due to thrift and laboriousness on the part of the workers, and also partly due to the assiduous cultivation of foreign markets, through government-fostered agencies, scattering price lists in the metric system, which the foreign buyer understood; but in a large degree it was also due to the steady and plodding application of applied science to the improvement of factory methods.

When the war broke out the Entente Allies discovered to their dismay that many important articles of manufacture had fallen unnoticed into enemy hands exclusively. Then it became glaringly evident that the rule-of-thumb policy of manufacture was only seemingly the cheapest, and that in the long run it was

actually uneconomical. Scientific workers, chemists, physicists, engineers and inventors had to be hastily enlisted to rehabilitate important departments of various industries that were suddenly hard hit.

We are perpetually reminded of the all too evident horrors and disasters of war, but even war carries certain benefits and mitigations. One compensation which this war has brought to the world at large has been the realization that in future no industry can be permanently maintained in the front rank without perennial good management on one hand and perpetual economically conducted scientific research for improvement on the other. It has at last become self-evident that the proper kind of industrial research, economically conducted, will pay in the long run. These facts have been known to the leaders of individual industries all over the world for many years. The war has by this time impelled their truth upon the leaders of nearly all the industries. The general attitude of industry toward applied science has been changed in three years of war as it might not have been changed during thirty years of peace.

Industrial research is manifestly not a new subject. It is merely a subject of rapidly expanding importance which has changed from local to national importance. What needs to be studied is the proper guidance for it. Injudiciously administered, it may defeat its own purposes. The question is essentially one of experience and education. The experience of those manufacturing concerns which have already benefited by industrial research calls for study. The applied sciences, moreover, have to be studied in technical schools and colleges by the young men and women entering business administration, and at least the elements of those sciences have to be studied in vocational schools by the more ambitious among those entering the ranks of industry.

Electrical workers are called upon, like workers in all other lines, to study the same subject with a view to increasing individual, local and national efficiency. What are the best steps to take for getting the best results out of industrial research in the factories, plants and central stations? Are the best methods for small concerns the same as those which have been found to be best by large concerns? By what means can the technical schools and colleges help in the movement?

These are some of the questions which may be expected to present themselves at the next meeting of the American Institute of Electrical Engineers, Oct. 8, at Philadelphia. The general subject for the meeting is "Industrial Research," and papers are scheduled for presentation at the meeting on different aspects of this very important topic. It is to be hoped that there will be a good attendance and that plenty of constructive suggestions may be offered in the discussions.

Modernizing a Condenser System

JOHN HUNTER'S second paper on the modernization of the great St. Louis central station furnishes an impressive example of the elaboration involved in the plant of a big supply company. The casual onlooker going into a generating room is impressed by the silent magnificence of the great whirling masses of metal, but seldom stops to think that these items of equipment are but the end of the line, from coal pile to kilowatts, and that behind them lies the boiler room with a mass of details in machinery and accessories of which the layman has very little conception. In this case increased capacity implied an entire rearrangement of the old system of supplying condensing water, and new and capacious channels had to be cut through solid rock. The details of the extensive work undertaken are of great interest to the steam engineer.

Of its magnitude the ordinary reader can perhaps gain the best notion by realizing that the suction tunnel for the condensing water in the new station requires at full load the pumping of 300,000,000 gal. (1,135,600,000 l.) of water a day, approximately three times the amount used in the general water supply of the entire city of St. Louis. Fortunately the hydraulic conditions are such that the amount of energy consumed in this pumping is far less serious than the statement of gross amount would indicate. The importance of close attention to the condensing system of the station is emphasized by the fact that St. Louis is not a region of dear coal where condensation can produce its maximum benefits; but even here it paid to go to the expense of an elaborate system for doubling the condenser water capacity in order to keep the turbines up to their fullest efficiency. With the old reciprocating-engine plants one could take a chance sometimes with mediocre condensing facilities, but today there can be no neglect of this feature of the installation. Its value is likely to be more appreciated in the near future even than now.

The Coming Issues

CONSTRUCTION and extension of electric service plants were held up for a long time owing to the high prices of materials, but we begin to hear of new installations being completed again as a result of the second reaction which took place when it was believed that conditions would not improve and might grow worse. One of these is a 20 000-kva. hydroelectric development in Maine, the features of which will be described in the Oct. 6 issue of the ELECTRICAL WORLD. Another subject which will be discussed and which should be of interest to electric service companies is how a Middle West company has rearranged the copper and transformers in its distribution system to care for increased loads. A new method of testing current transformers which does not require the use of special apparatus and which is highly precise will also be explained. In the second issue of October there will appear the third installment of an instructive series dealing with the rehabilitation of a St. Louis station. This installment will dwell on the features of the steam-making equipment.

Prolonging the Existence of Cedar Poles

Inspection of Those on Large Distribution System—Estimated Life of Poles and Cost of Treatments—Comparison Between Brush and Open-Tank Methods

BY HERBERT W. MEYER

SOME of the information gathered from an inspection of 20,000 poles in the distribution system of the Minneapolis General Electric Company are presented in this article. The object of this inspection was to make a complete record of the condition of every pole in the system, especially those which needed to be

FIG. 1—THICK MAT OF FUNGUS ON POLE BUTT

replaced. Additional information of more general interest was brought to light as a result of the investigation.

METHOD OF SECURING DATA

A tool similar to a brick hammer was used to dig away 6 in. or 8 in. (15.2 cm. or 20.3 cm.) of earth at the butt of each pole and to probe into the decayed wood to ascertain the extent of the rot. A memorandum was then made of the conditions observed and such additional information concerning the insulators, guys, lines, transformers, lightning arresters, and so on, attached thereto as might be required. On the opposite page of the notebook was indicated the location of each pole. The final step of the inspection was to label the pole on the street side with a brass tag. On this was marked the year when it was expected that the pole would have to be replaced.

To predict the life which a pole might be expected to give is not always easy, since a variety of factors must be considered. The basis for different lengths of life assigned is shown in Table I.

The foregoing statements apply to Western red-cedar poles. Northern white-cedar poles have not been set in these lines in recent years, so that similar data cannot be given for them. However, a number of these poles which were set more than twenty years ago are still standing and are giving excellent service at the present time.

According to the experience of this company, the average life of untreated poles is about nine years and of the brush-treated poles about twelve years. It may be noticed that the minimum life given for brush-treated and untreated poles, as well as poles which have stood in the line until the creosote has evaporated to a large extent, is the same in each case. This apparently in-

TABLE I—CONDITIONS GOVERNING LIFE OF POLES

Condition of Butt	Estimated Life, Years
1. Newly set pole, brush-treated with creosote well above ground line	8 to 15
2. Newly set untreated pole	8 to 10
3. Creosote treatment gone, but wood still firm	8 to 11
4. Butt becoming soft, often accompanied by the appearance of fungus-fruiting bodies	6 to 8
5. Sap wood rotted; heart wood firm	4 to 7
6. Sap wood rotted; heart wood showing rot in the neighborhood of checks	0 to 4
7. Heart wood showing rot around the entire circumference	0 to 4
8. Sound shell; rot within	0 to 6

consistent assumption is based on the fact that brush-treated Western red-cedar poles often have a sound shell at the butt and still have rot beneath. A condition of this sort is due to the fact that the wood has become infected before being set and often before being treated, so that rot begins within the sap wood and is stopped at the outside surface, which has been penetrated by the antiseptic treatment.

FIG. 2—NUMEROUS FINE BRANCHES OF TREE ROOT GROWING INTO A POLE

Rotting of wood, as is quite generally known, is caused by vegetable growths which feed upon its substance and so alter its characteristics that we say the wood has become rotted. Ordinarily these vegetable growths are fungi, but there can be little doubt that the roots of grass and trees attack wood in a similar manner. Indications that this is true are given by

Fig. 1, which shows a thick mat of fungus on a pole butt, and by Fig. 2, which shows a tree root having numerous fine branches investing the entire sapwood, growing into a pole and acting to all appearances exactly like the fungus.

COMPARISON OF ESTIMATED COSTS OF BRUSH-TREATED AND OPEN-TANK-TREATED POLES

Year	Cost per Pole		Cost per Pole per Year with Interest at 6 per Cent		Difference	No. of Treated Poles in Use	Saving per Year
	Brush-Treated	Tank-Treated	Brush-Treated	Tank-Treated			
1917...	$22.48	$23.58	$3.22	$2.39	$0.83	2,460	$2,040
1918...	22.69	23.79	3.25	2.42	0.83	4,900	4,060
1919...	22.90	24.00	3.28	2.44	0.84	7,400	6,200
1920...	23.11	24.21	3.31	2.46	0.85	9,800	8,300
1921...	23.32	24.42	3.34	2.48	0.86	12,300	10,600
1922...	23.53	24.63	3.37	2.51	0.86	14,800	12,700
1923...	23.74	24.84	3.40	2.53	0.87	17,200	15,000
1924...	23.95	25.05	3.43	2.55	0.88	19,700	17,300
1925...	24.16	25.26	3.46	2.57	0.89	22,200	19,800
1926...	24.37	25.47	3.49	2.59	0.90	24,600	22,100
1927...	24.58	25.68	3.52	2.61	0.91	27,100	24,600
1928...	24.79	25.89	3.55	2.63	0.92	29,500	27,100
1929...	25.00	26.10	3.58	2.65	0.93	32,000	29,800

As the poles of the system under consideration had been brush-treated with three coats of hot creosote, there can be no doubt that such a treatment is profitable, compared with the use of untreated poles. However, it appears that far better results could be obtained by preservative treatment which would penetrate the entire sapwood and prevent the evil previously mentioned.

On the basis of facts gathered from this inspection, a comparison was made of brush-treated and open-tank-treated poles. The results are given in the table. This is based on the following data: Cost of average pole complete set in line, brush-treated and open-tank-treated, $22.48 and $23.58 respectively; average life of brush-treated and open-tank-treated poles, twelve years and twenty-four years respectively; estimated increase in cost of average pole in next twelve years, $2.50, and estimated number of poles in system in twelve years, 32,000. It was also assumed that one-twelfth of 32,000 poles would be replaced or set new each year, until in twelve years the entire system would consist of tank-treated poles.

The inspection was made by the writer under the supervision of L. D. Smith, general superintendent, and G. L. Mitchell, electrical engineer, of the Minneapolis General Electric Company.

Residential Street-Lighting Equipment

Principles Involved in Selecting Lamps and Accessories, in Determining Lamp Heights, and in Installing Ornamental Systems in Small Towns and Cities

BY JAMES R. CRAVATH

Last week this series on street lighting for small towns and cities took up the general principles for observance in lamp spacing and location with overhead circuits in residential sections. A further discussion of lighting for residential sections is contained in the present article, wherein are brought out the principles involved in the selection of lamps and accessories, in determining proper lamp heights, and in installing ornamental systems.

IN SELECTING lamps for residential sections the size of lamps should be in accordance with the amount of money available for lighting the particular district. A street-lighting expenditure of $1 per capita is a very common figure in small towns. A few exceed and many fall below this standard.

As to the size of lamp that should be used, many believe that the 600-lumen, 60-nominal-candlepower lamp is the smallest which should be employed anywhere in street lighting. There is much force in this contention, because a reduction in size below 600 lumens involves so little reduction in annual cost that the saving hardly seems worth the decrease in light. The reason for this is that the fixed charges on distribution and lamps are just as much for lamps rated at less than 600 lumens as for the 600-lumen lamps. These fixed charges are considerably more than the electrical energy and lamp renewal costs. For example, if electrical energy costs 2 cents per kilowatt-hour and a 47-watt, 600-lumen lamp is used, the electrical energy cost will only be $3.76 per lamp-year on a 4000-hour schedule. Adding to this $3 for lamp renewals makes $6.76 for the variable cost proportionate to the size of the lamp. The maintenance and fixed charges will nearly always be in excess of $10 per lamp for all the smaller sizes of tungsten lamps without regard to their exact size. A little saving in lamp wattage therefore makes small difference in the total price. Even the 600-lumen lamp is rather small for anything but the most sparsely settled outlying districts, where it acts somewhat as a pilot or beacon light to indicate the location of the roadway.

On the well-settled residence streets, lamps of 1000 lumens and 2500 lumens at street intersections with mid-block lamps, where necessary, as before outlined,[1] represent the best practice of to-day.

In the most densely settled residence streets, unless the blocks are of such dimensions as to make mid-block lamps advisable, lamps larger than the 2500-lumen gas-filled tungsten units are advisable. The next largest sizes of tungsten lamps are the 4000-lumen and 6000-lumen. At this point the magnetite arc comes into competition, as a 4-amp. arc, if equipped with short-life high-efficiency electrodes, is a somewhat more efficient light producer than the gas-filled tungsten lamp. The maintenance and trimming of the arc is also likely to be less than the lamp renewals of the incandescent unit.

The deciding factor in such a case is likely to be the relative amount of the street lighting to which the arc is suited. If there is a district large enough, and situated so that it can be supplied from one or more magnetite arc circuits and load a transformer and rectifier

[1] ELECTRICAL WORLD, Sept. 22, 1917.

set, the use of the arc would be indicated, provided that either one of the two following conditions exist: (1) If the number of smaller lamps required in the outlying districts is relatively small, these small lamps, which of course must be tungsten, can be supplied from the magnetite arc circuit at 4 amp., although this practice is not recommended by the manufacturers and has some drawbacks as will be explained later. (2) If there are enough of the smaller outlying district lamps to justify a separate circuit and transformer, the incandescent lamps can be supplied from a 6.6-amp. transformer without rectifier. There are many magnetite-arc circuits of 4 amp. upon which 4-amp. series tungsten lamps are operated with fair success. It is not considered the best of practice at the present time, however, because the surges on circuits of arc lamps are likely to be greater than upon an incandescent lamp

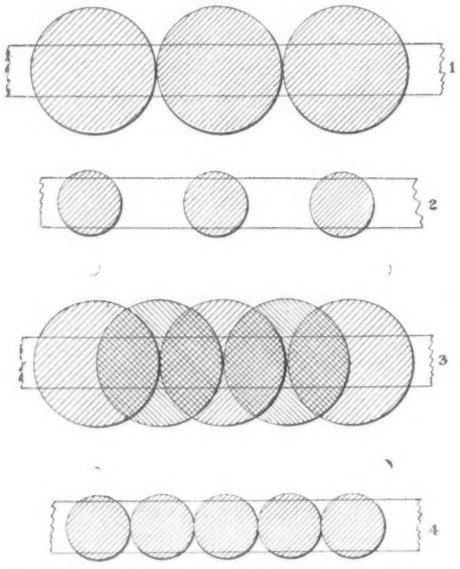


DIAGRAM FOR SHOWING BEARING OF SPACING ON USE OF REFRACTORS

circuit, to the detriment of the life of the incandescent lamp. Furthermore, since the magnetite-arc circuit is direct-current, there is more danger when a lamp burns out that an arc will be maintained between the terminals in the lamp which will ultimately not only destroy the lamp base but the receptacle and film cut-out. In spite of these disadvantages the use of the 4-amp. incandescent lamp on a magnetite-arc circuit is probably the best plan when only a few such lamps are required.

If the nature of the block and lamp distribution of the district is such that large and small lamps must be interspersed, it is in general likely to be better to adopt the tungsten lamp throughout, so that the various sizes can be operated on the same 6.6-amp. alternating-current series circuit. Of course, each case must be figured according to its conditions, taking into account the relative investment and the lumens obtainable per lamp with the given type of equipment proposed. Comparison in light output in lumens of the different lamps and accessories should be made in accordance with the figures given in a previous article assuming the same light-distributing equipment for each lamp.[2] In other words, should a refractor be assumed in one case, then a refractor giving a similar distribution should be assumed in the other. Likewise the small internal reflector on the magnetite arc and the radial wave reflector on the tungsten lamp may be considered as approximate equivalents. Diffusing globes are similar in action on both arc and tungsten lamps.

SELECTION OF ACCESSORIES

Where lamps are spaced from 600 ft. to 250 ft. (182.88 m. to 76.2 m.) apart the type of light distribution obtained with the refractor is undoubtedly the best. The refractor as ordinarily used, giving the maximum candlepower about 80 deg. from the vertical, will give its maximum candlepower in a direction to strike the ground on a level at 100 ft. (30.48 m.) distant when the lamp is about 17.5 ft. (5.33 m.) high. This will, of course, fall short of striking midway between lamps when they are over 200 ft. (60.96 m.) apart. By raising the lamp to 22 ft. (6.71 m.), which is about as high as it is usually practicable to go in residential streets, even with center suspension, involving minimum tree interference, the rays of maximum candlepower will strike the ground about 125 ft. (38.1 m.) away. This would indicate that 250 ft. (76.2 m.) would be a spacing which would cause the maximum rays to meet at a point midway between lamps with a 22-ft. (6.7-m.) lamp height. With a 17.5-ft. (5.33-m.) lamp height the lamp spacing corresponding would be 200 ft. (60.96 m.). For lamp spacing between 150 ft. and 250 ft. (45.7 m. and 76.2 m.) there is room for some difference of opinion as to whether a refractor or some form of accessory giving more light near the lamp is best. Such a distribution as is obtained with a radial-wave reflector is satisfactory, but the appearance of the unit will often be objected to on streets where such a short spacing can be afforded. For spacings 150 ft. (45.7 m.) or less there is no question that a diffusing globe gives more satisfactory distribution than a refractor.

To sum up: for the great bulk of residence district lighting at the present time the type of light distribution offered by the refractor is the best. For special ornamental lighting in districts where a closer spacing than 200 ft. (60.96 m.) is to be used a diffusing globe is best for very short spacings, and for spacings between 150 ft. and 200 ft. (45.7 m. and 60.96 m.), as measured in air line between lamps, either a diffusing globe or some combination of refractor and diffusing globe is best.

As explained in a previous article,[3] it is not necessary to adjust refractors so that they give their maximum candlepower 80 deg. from the vertical. They can be adjusted to give their maximum as low as 65 deg.

The reasons for the use of refractors on long spacing and the objections to their use on short spacings can perhaps be best illustrated by the accompanying diagram. Here the upper row of lamps equipped with refractors have the circles which they cover represented by lightly shaded areas. In the second line is a row of lamps equipped with diffusing globes the effect of which is to illuminate the ground near the lamp more brightly, as indicated by the more heavily shaded circles. However, as it appears to the ordinary eye, this illuminated circle appears much smaller and the dark unlighted spaces between lamps much greater than

[2] ELECTRICAL WORLD, Sept. 8, 1917.

[3] ELECTRICAL WORLD, Sept. 8, 1917.

with the refractor as spaced in the first upper line. If we space refractors as in the third line, there is an overlapping of the areas covered by each lamp. Now, while this overlapping is considered desirable in interior lighting because it helps us to avoid objectionable shadows, it is not desirable in street lighting, where obstructions lying in the street as well as many other objects must be distinguished by the shadows which they cast. For example, a paving stone the same color as the surrounding street lying in the street midway between the refractor units in the third line might be lighted so evenly from both directions that it would be hard to distinguish, since there would be but small shadows and no difference in color to permit it to be distinguished. Another objection to the refractor arrangement which is evident on the third line with close spacings is that such a quantity of the light is not falling upon the street at all. This, of course, applies also to the refractor arrangement with long spacing in the first line, but in the first line the intersecting street gets some of the light which otherwise would be wasted, and even if the lamps were not at a street intersection the necessity of bringing up the illumination midway between lamps would make the waste of light a secondary consideration. In the case of the refractor with a close spacing in the third line, however, we have a better alternative in the fourth line by using a diffusing globe or any device that will produce a greater street brightness near the lamp. Here on the fourth line there is not so much overlapping of light from two lamps as in the third line, and more of the light falls on the street surface.

Refractors for tungsten lamps are made both in bowl and band type. There is also a dome-shape refractor of recent design used inside of a stippled diffusing globe and employed in large numbers in Cleveland. The band refractor as applied to tungsten lamps allows a considerable portion of the downward light to be emitted without going through the refractor. This band type has the advantage of being small and less expensive than the bowl type which extends under the lamp. Cleaning is slightly easier than with bowl type. However, when lighted it does not present quite so finished an appearance as the bowl type, as the lamp filament is visible from points under the lamp and the lamp bulb is not concealed by the refractor.

LAMP HEIGHTS

From what has already been said in this article in connection with refractors and in a previous article concerning glare it is evident that within practical limits the higher lamps are placed the better. These practical limits are usually the shade trees and pole line. With center suspension it is usually practicable to maintain lamps at a height of 20 ft. to 22 ft. (6.07 m. to 6.71 m.) above the ground. With lamps on brackets over the curbline the 22-ft. height is desirable if there are no trees to obstruct, but usually tree limitations make it necessary to put the lamp down to a height of about 15 ft. (4.57 m.). The lower the lamp the greater the necessity for close spacing. This is partly on account of the trouble from glare with low lamps and partly because it is impossible to get adequate illumination midway between lamps with any devices now available.

For ornamental boulevard lighting systems, which are usually on heavily shaded streets, the closer spacings demanded by ornamental considerations make it permissible to use lower lamps than would be satisfactory on ordinary streets where longer spacings prevail. Nevertheless, it is advisable to maintain a height of 14 ft. to 15 ft. (4.2 m. to 4.5 m.) for such work, this being about the maximum practically obtainable at the present time with the posts on the market.

ORNAMENTAL SYSTEM IN RESIDENCE STREETS

The extension of ornamental lighting systems into residential streets is by no means so general as the movement for business-street "white-way" lighting. However, it is on the gradual increase. It is usually handled financially by special assessment or private enterprise among interested property owners. The method of treatment of this ornamental lighting must depend altogether on the amount of money available and the names of the property owners interested. In some cases the main object of the property owner seems to be to get the wires underground and then get up some kind of ornamental post rather than to improve the lighting conditions greatly. On account of shade-tree conditions, as previously explained, it is usually not feasible to go above 14 ft. to 16 ft. (4.2 m. to 4.9 m.) lamp height. As far as illumination is concerned, this lighting should be done with high posts and long spacings were it not for shade-tree interference. However, the ornamental effect of frequently spaced lamp posts is not to be overlooked by the designer, and therefore it is a mistake to attempt such lighting with posts at long intervals where funds are available to place them at short intervals. Where spaced at short intervals the best effects can be obtained by the use of diffusing globes, as already explained under the head of "Selection of Accessories."[1]

The steel-taped, lead-covered underground cable which can be buried directly in the sod of the parkway is undoubtedly the cheapest and best method of wiring to this class of work. It is more reliable than a cheap pulled-in duct conduit and much less expensive than a good duct conduit line.

The usual place for the cable is just inside the curb in the sod of the parkway. A trench 1 ft. (30 cm.) deep is sufficient. Intersecting streets can be crossed either by removal of the paving surface or by boring underneath the pavement. Where the soil is not full of rocks and boulders and there is a good permanent pavement the latter is to be preferred. A work hole is dug in the parkway outside of the curb on each side of the street and an iron pipe made up from short lengths forced through with a jack or a pipe-forcing machine. The cable is pulled in behind the pipe as the pipe is withdrawn.

On large series systems of this kind a disconnecting series pothead in the bottom of the post is desirable so that a grounded lamp post can be cut off without opening the circuit. On the other hand, if the lead-covered cable is carried direct to the lamp terminals possibilities for trouble are much reduced, so that on small systems the elimination of the pothead and cut-out is probably the best plan.

Present preference is for a post-head globe or fixture rather than a bracket, although very good and artistic results can be got with either form.

[1] ELECTRICAL WORLD, Sept. 8, 1917.

Graphical Presentation of Electrolysis Data

Electrolysis Department Which Will Also Report General Conditions in Subways Advisable—Relative Advantages of Three Schemes of Presenting Data

BY H. A. COZZENS, JR.

MANY large operating companies have found it practicable to establish and maintain an electrolysis department, the function of which is to make routine tests on all cables, to gather data on the potential of the cable sheaths with respect to other structures, and to report on the general condition of the underground system. These reports serve as a basis for recommending either new or additional bonds and drainers, negative returns, or whatever remedy may seem advisable in mitigating electrolysis.

The work of the department is in many cases limited by the attitude of the company toward bearing the expense of such investigations. However, it so happens that additional work, such as reporting on the general condition of the subway, making manhole inspections and reporting on the temperatures of cable sheaths, may be assigned to the department so as to make its work extend throughout all seasons and be invaluable to the company in producing efficient and continuous operation.

A distinct advantage is that the work of the electrolysis department is centralized and conducted from one office. The subway and cable work may be conducted in the various municipalities under the direction of the resident superintendent. Under this plan a wide range of conditions may exist in various cities, and one single department inspecting subway systems is in a better position to decide and recommend changes than the individuals in any one locality.

The work of an electrolysis department is practically the same in all companies as regards the method of securing the data. The men are equipped with suitable instruments, preferably a combination millivoltmeter and voltmeter designed especially for electrolysis work. The leads from the electrolysis instrument terminate in two long rods which may be pressed against the cable sheaths without the necessity of the observer entering the manhole. These rods make it possible to secure the readings rapidly and easily. In each manhole the potential difference between the cable sheaths and various structures such as water and gas mains, telephone cable sheaths, railway tracks and the ground, as well as the current flowing along the sheath, is secured.

These data are collected on sheets covering the following entries: Street intersections—time; electrolytic survey—potential of cable (plus or minus) to track, water mains, gas mains, telephone and earth; current determination—distance on sheath, millivolt drop, amperage and direction of flow; subway inspection: (1) cables—corrosion or pittings, properly racked, protected at duct edge, sharp bends, insulated on hangers, fireproofed, leakage of compound, bonded, sheath temperature; (2) manholes—water, débris, illuminating gas, ventilated. Space is included for "remarks." The sheets may be of the loose-leaf variety, which permits them to be filed for reference from year to year. It is obvious that in one month's time a single group of men may bring in a considerable quantity of data. After the data are secured the question is how to present the information so that it may be readily interpreted and understood by those who have only a slight knowledge of electrolytic conditions and their elimination. Many engineers are contented to glance over the field sheets and, if the readings are minus in the majority of places, to accept conditions as being satisfactory in that locality. After this preliminary and hurried study, the data sheets are usually filed away and forgotten.

Some definite method of reporting the findings of the department should be adopted. On rainy days no surveys can be undertaken, so an opportunity to work up reports in some form or other is afforded. There are

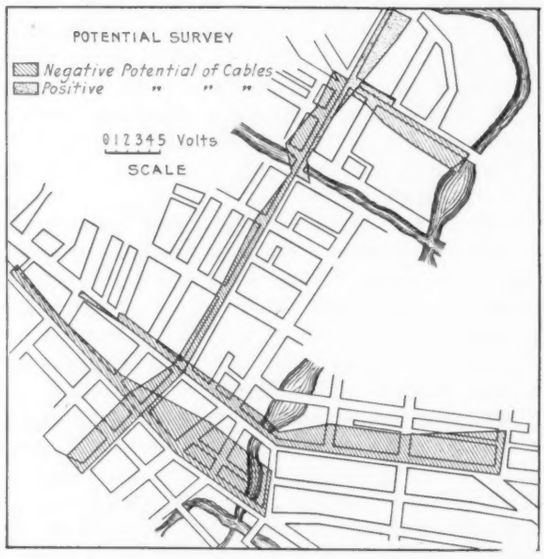


FIG. 1—POLARITY OF CABLE SHEATHS TO OTHER UNDERGROUND STRUCTURES INDICATED BY COLOR OF BANDS AND POTENTIAL BY WIDTH

many ways of presenting data, each of which has its advantages, and all are governed largely by local conditions and personal approval. In what follows no attempt is made to prove the merits of any one scheme nor are those illustrated considered above improvement.

One of the most elementary schemes for graphically presenting data is shown in Fig. 1, which represents a section of a large map. Each year as the survey is made the potential observations are entered thereon. Where the potential of the cable sheath is minus to other structures, meaning that the current is flowing from those structures on to the cable sheaths, the readings are entered in green. Where the potential is plus, the reverse holds true and the readings are entered in red. It is assumed that the company is interested primarily in the potential of its own cable sheaths and not in the condition of structures outside the ownership of the company. These maps are for routine tests only and do not indicate any elaborate tests or special findings.

The advantages to be gained by the presentation of data in this manner are: (1) An executive can, at a glance, tell by the green indications that conditions are satisfactory from a potential standpoint with regard to the cable sheaths. If there are red spots, he can see if they are isolated or exist in a particular locality and are

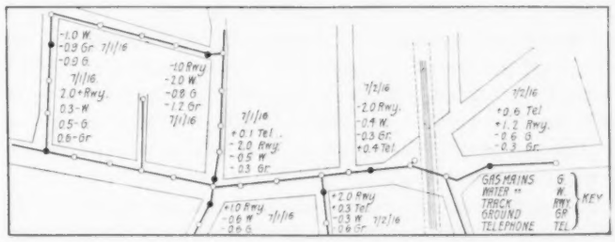


FIG. 2—POLARITY OF CABLE SHEATHS INDICATED BY COLOR OF DOTS AND POTENTIAL BY FIGURES

influenced by the potential conditions of some other structure. Each year the readings are added to those already indicated on the map so that a record is obtained of any changes in the electrolytic conditions in this locality.

The disadvantage in connection with such a plan lies in the fact that no comparison can be established between the potentials in the various vicinities or in different years unless the map is studied carefully and the readings are kept in mind when looking at other sheets. The mere indication in color does not show the magnitude nor the relation between the observations.

To eliminate this disadvantage and yet embody the merits of the former scheme, the plan shown in Fig. 2 may be adopted. Several copies of the map of a municipality are made as white prints from a tracing which should show the subway construction in the city. One of these prints is devoted to the potential survey between the cable sheaths and some one other structure. A datum or base line is drawn through the center of the street and the readings are plotted to a convenient scale. The coloring remains the same, green for satisfactory conditions and red for the reverse. At a glance a person can determine the potential difference existing between the cable sheaths and any one structure. It is possible to tell if there is a gradual increase or decrease in potential and also the relative magnitude of the difference throughout the system.

In Fig. 3 a more elaborate scheme for illustrating the potential difference is shown. This method shows the relation between distance and potential difference.

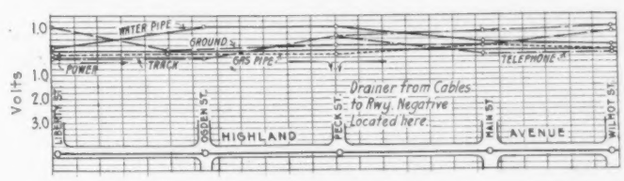


FIG. 3—RELATION BETWEEN DISTANCE AND POTENTIAL DIFFERENCE

It is particularly adapted for use in cases where the subway systems extend radially from one generating station to several substations. Each arm of the system may be plotted as a unit on a separate sheet.

The subway system is laid off to a convenient scale as shown in the lower part of the diagram, and the manholes are definitely located as related to distance from the generating station. The streets are then built around the subway system so as to make the location of manholes convenient by reference to the street intersections. The vertical scale is laid off in volts, the portion above the datum line being treated as positive and that below as negative. The potential of the cable sheath is assumed as zero and the potentials of the other structures are referred to the sheaths.

For instance, assume that the potential of the cable sheath is minus two volts to a water main. In other words, the potential of the water main is two volts higher than that on the sheath so that the curve representing the water main would pass through a point two volts higher than the datum or cable-sheath line at this location. Assuming that there is an exchange of current, structures located above the datum line indicate a higher potential and that the current is flowing from these structures onto the cable sheaths. If the structures are represented by curves below the line of the cable sheaths, the current is flowing away from the sheaths onto the other structures.

The advantage of this chart is that the potential differences of all structures are indicated on the one chart

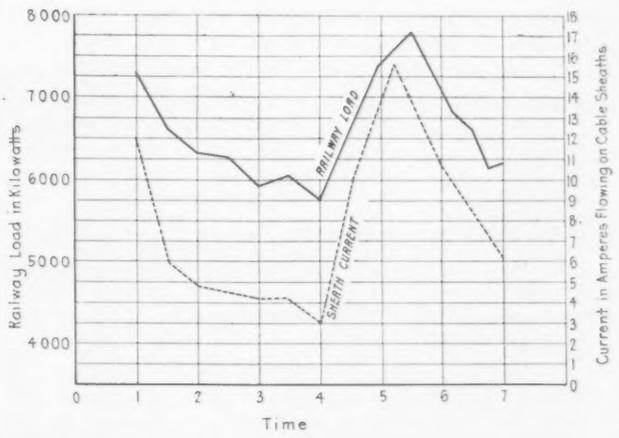


FIG. 4—OBSERVATIONS OF SHEATH CURRENT WITH DIFFERENT RAILWAY LOADS

making comparison easy. The relationship and magnitude of the differences are shown so that any abrupt change may be analyzed.

The mere acquiring of data as to the potential differences in a cable system is not by any means the most important work in an electrolysis survey. The potential differences will by virtue of their magnitude and direction indicate where the most damage is likely to occur from electrolysis. However, electrolysis occurs chiefly where current leaves a sheath and flows to the earth. Furthermore, the fact that current flows onto the sheaths is not always an indication of the most satisfactory condition, since the current is likely to become excessive and provisions must be made by the use of drainers to remove the currents or to reduce them. Hence it is of importance that current readings be taken in conjunction with the potential differences so as to determine the presence and the magnitude and the direction of the currents on the cable sheaths.

To determine the current, the potential drop is taken along the sheath for a certain distance, and, knowing the resistance, the value of the current is computed. These values, together with the direction of the current, may be entered on the charts. In Fig. 3 a drainer is

located as indicated and the current is flowing toward the drainer and thence overhead to the railway negative.

These surveys may in some instances reveal considerable variation of current on the cable sheaths. It is sometimes well to take current readings over a period of time so as to ascertain the maximum and minimum as well as the average value of the current. There are several forms of recording meters which may be attached to the cable sheaths and will give the drop on the cable sheath over several days so that a continuous record of the current flowing may be obtained. The record as taken from the recording meter and the railway load curve extending over the same period may be plotted together as in Fig. 4. This chart will aid in establishing that the current on the sheaths is due to the leakage from the railway tracks, as there is a marked similarity in the form of each curve.

The values of the current flowing on the cable sheath may be plotted against distance as in the case of potential differences illustrated in Fig. 3. This form of curve will show the current increments as the cables near the station and will point out the localities in which the greatest leakage is present. The current increment should be uniform as the station or a drainage connection is approached. These methods are only a few of the numerous forms in which electrolytic survey data may be plotted. The charts will in most cases be of great value in analyzing the trouble and selecting an appropriate remedy.

THE CANTONMENT—A CIVIC OPPORTUNITY AND DUTY

Experience of Central Station Manager in Rockford, Ill., in Assisting His City to Secure and Serve One of the National Army Camps

When the choice of cantonment sites was under consideration at Washington electric utility executives in many cities were confronted with a civic opportunity and a chance to perform a national duty.

Adam Gschwindt, vice-president and general manager Rockford (Ill.) Electric Company, saw the opportunity. Within the Chamber of Commerce, of which he is past-president, he at once organized a committee of eight, representing the leading basic industries. It was composed of a real estate man, a financier, a newspaper man, a steam transportation authority, an electric transportation executive, a lumber and fuel dealer, a water supply man and an electricity supply man. This committee was on its way to Washington within a few hours. It submitted to the War Department the advantages of Rockford as a cantonment site. Rockford has been dry for eight years. Organized vice has not existed for fifteen years. Its water supply is excellent. The camp site lies between two rivers. It had natural advantages necessary for a rifle range. Transportation facilities and electric supply were available. The city is large enough to take care of the soldiers' visitors. And the site was not far from Chicago, from which a large part of the Illinois quota of the new National Army will be drawn.

Considerable political ingenuity, time given to various viewing boards, frequent trips to the national capital—all hopefully and cheerfully donated—were finally followed by the good news that Rockford would get the camp. That was the signal for the committee to begin real work. There were leases to be secured on 4000 acres of land, some land to be purchased outright, property damages to be met, $100,000 to be raised and roads and electric lines to be built. All this had to be done immediately, and in the face of none too much willingness on the part of some property owners.

When all preliminary necessities had been carried out successfully and skillfully, and workmen and materials began to arrive, people began to visualize—to get the proper perspective on Camp Grant. The sound of so many carpenters hammering that the noise is like the patter of raindrops is certain to awaken realization of what is required to construct in eight weeks a city to house 40,000 men. Such things have been found more successful in conveying the proper impression than statistics, impressive as figures are.

The camp site, for instance, comprises 4000 acres, Land leases were taken at $20 an acre a year. The camp will house 30,000 to 40,000 men, or two-thirds as much as the total population of Rockford. In construction 6500 workmen and 1000 soldiers are employed. Wages of workmen range from $3.50 per day for water boys to $8 a day for certain mechanics, with the average about $6. The connected electric load at the camp will be about 1000 kw. The original lamp order was for about 40,000 40-watt incandescent bulbs.

These things and more the committee of eight, under Mr. Gschwindt as chairman, had not only to grasp for itself, but also to digest for the community. The committee saw that getting the camp was an incident compared with serving it. And serve it they must, was the unanimous resolve, for both patriotic and selfish purposes. As one man put it, "What that major did not want was nothing." The committee of eight has supplied the major's wants for the men in his charge, from smoking tobacco to bridges. Nothing has been impossible.

The camp, now under roof, is connected by concrete and macadam roadways with the city. Electric light and power and telephone service are provided. For the electric utility man, who was in the thick of it from the start, the civic opportunity has been grasped and the first phase of the national duty is almost fully discharged. The result is twofold.

First, the direct effect on the income account, even as early as July, from increased use of commercial lighting by merchants who by catering to the 7500 men doubled weekly sales. Second, the indirect result visible in the public attitude. Even in local politics the complexion of things has changed for the utilities; especially for the electric railway, which has a franchise pending, this will be valuable immediately. The utility executives, by their successful and whole-hearted participation in the cantonment program, have placed their companies upon a plane so high in the public mind that it would be political suicide for the demagogue to use his old-style attack.

With the full quota in training the soldiers will practically quadruple the actual earning populace of the city. To realize what will be the result of Rockford's attainment of its ambition—namely, that the camp become permanent—is to appreciate fully the importance of what Mr. Gschwindt terms "the civic responsibility of the utility manager."

OPERATION OF ICE-PLANT MOTORS AT CONSTANT LOAD

By Varying Other Factors to Insure This Condition Maximum Use of Equipment Is Obtained Under Best Conditions

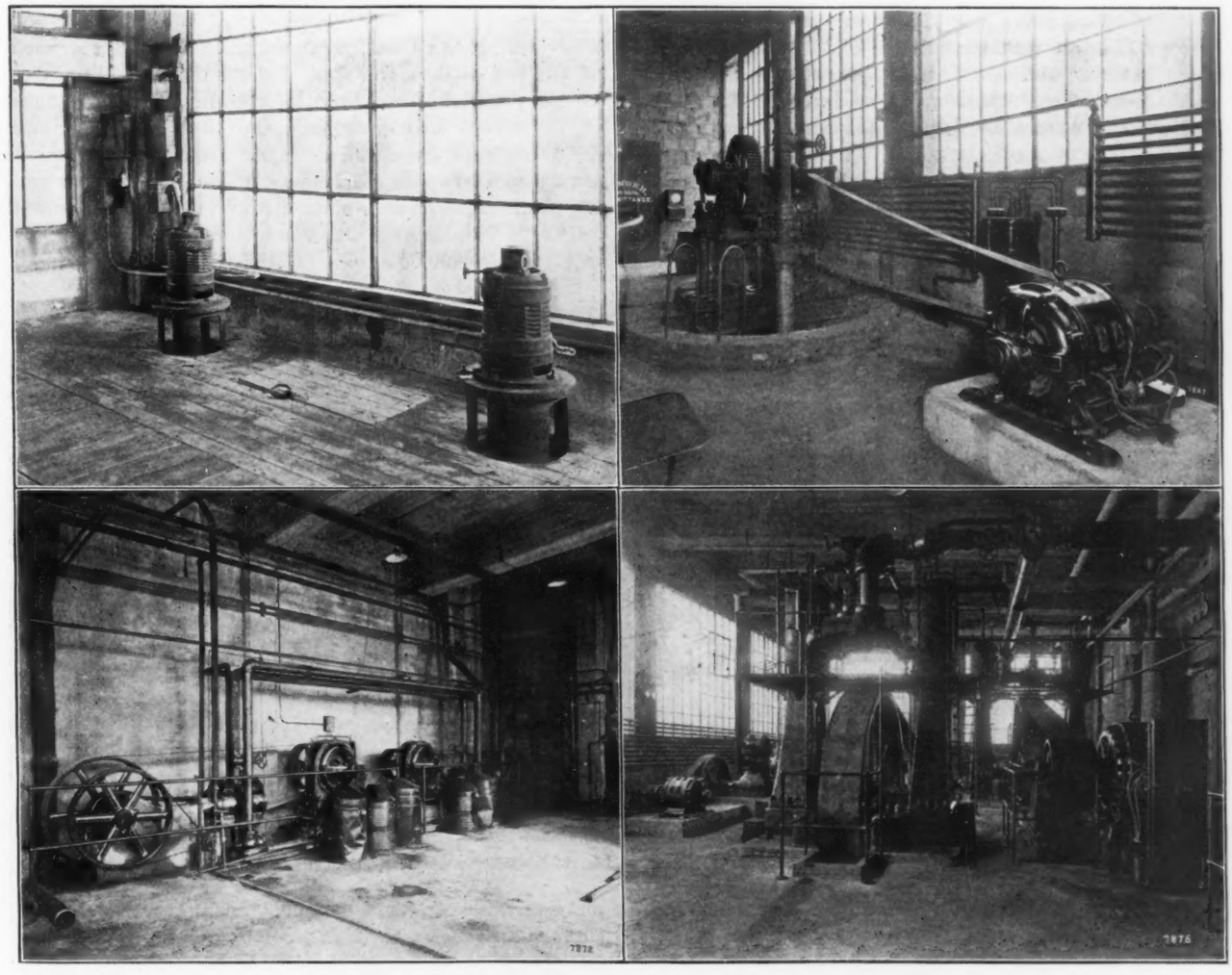
The advantages of the exact control of machinery permitted by the use of electric power are well demonstrated in the case of the Greater New York Ice Company's plant, which receives energy from the Edison Electric Illuminating Company of Brooklyn. Since the ice company pays for energy on a maximum-demand rate, it has undertaken to take full advantage thereof by operating its machines on the basis of power input, keeping that constant and varying other factors to meet the changes in operating conditions. With all known factors held constant, variations in the power curve point directly to unsuspected troubles—hot bearings, etc.—which are immediately hunted down and remedied. In consequence this plant is operated at a very high efficiency, it being claimed that 250 tons (227 t.) of ice are produced in twenty-four hours by 350 hp. in motors operating the compressors. At the same time the cost for the energy consumed is minimum.

As is the case with many modern ice plants, the Greater New York Ice Company uses raw water only. Water from the city mains and from wells on the property is pumped into the cans after being purified and filtered and is frozen while being agitated by compressed air. In many plants it is necessary to pump out the core water from each can, because of the impurities that collect in it, and add fresh water before the final freezing; but the water supply of the Greater New York Company is so good that this does not have to be done.

Energy is received at 6600 volts in a compartment from which all unauthorized employees are excluded. In this compartment are the high-tension switchboard, with its meters and section switches, and the transformers which reduce the voltage to 440 volts for power purposes and 110 volts for lighting.

DESCRIPTION OF THE EQUIPMENT

The main equipment of the plant consists of two York compressors, one a 16-in. by 18-in. (40.7-cm. by 45.7-cm.) machine driven by a 200-hp., 480-r.p.m. Westinghouse squirrel-cage motor, and the other a 14-in. by 16-in. (35.6-cm. by 40.7-cm.) machine driven by a 150-hp., 725-r.p.m. motor. These motors are started by auto-starters, which first apply low voltage, and then,



SOME METHODS OF APPLYING MOTORS IN NEW YORK ICE PLANT

The brine agitator motors shown in the upper left-hand corner are rated at 2 hp. each and require no starting compensators. To the right is a 25-hp. motor driving a 500-gal.-per-minute pump with a 70-ft. lift; it is used in winter to operate a 24-ton compressor. Below at the left are two air compressors driven by 40-hp. motors; at the right are three compressors (a 24-ton auxiliary, one 14-in. by 16-in. and one 16-in. by 18-in. machine) driven by 25-hp., 150-hp. and 200-hp. motors respectively.

when the motor is nearly at full speed, connect the motor directly across the line.

In addition, there is a small 24-ton (21.8-t.) York compressor, driven by a 25-hp. Westinghouse squirrel-cage motor, which is used to keep the rooms and tanks cold on nights and Sundays in winter when the rest of the plant is shut down. As this machine is idle in the summer, its motor is used to drive a 500-gal.-per-minute pump (1893-l.-per-minute) with a 70-ft. (21.3-m. lift during this season when additional water supply is needed. Two compressors serve to supply the air used for agitating the water in the cans while freezing. Each compressor is belted to a 40-hp. General Electric motor.

Altogether, there are 2802 cans, providing a capacity of 250 tons in twenty-four hours. These cans are immersed in the cold brine, which is kept in motion so as to reach all the cans uniformly by agitators driven by 2-hp. vertical Westinghouse motors. These motors are started by simple switches, which connect them directly across the line.

When the freezing is completed three cans are lifted at a time by an electric hoist and taken to the end of the room, where they are dipped into warm water. This loosens the ice cakes, and these are dumped out and are lowered to the storage room below by an automatic elevator, which does not start until all three cakes are on board.

N. S. Friedmann, 90 West Street, New York, was consulting engineer for the ice company.

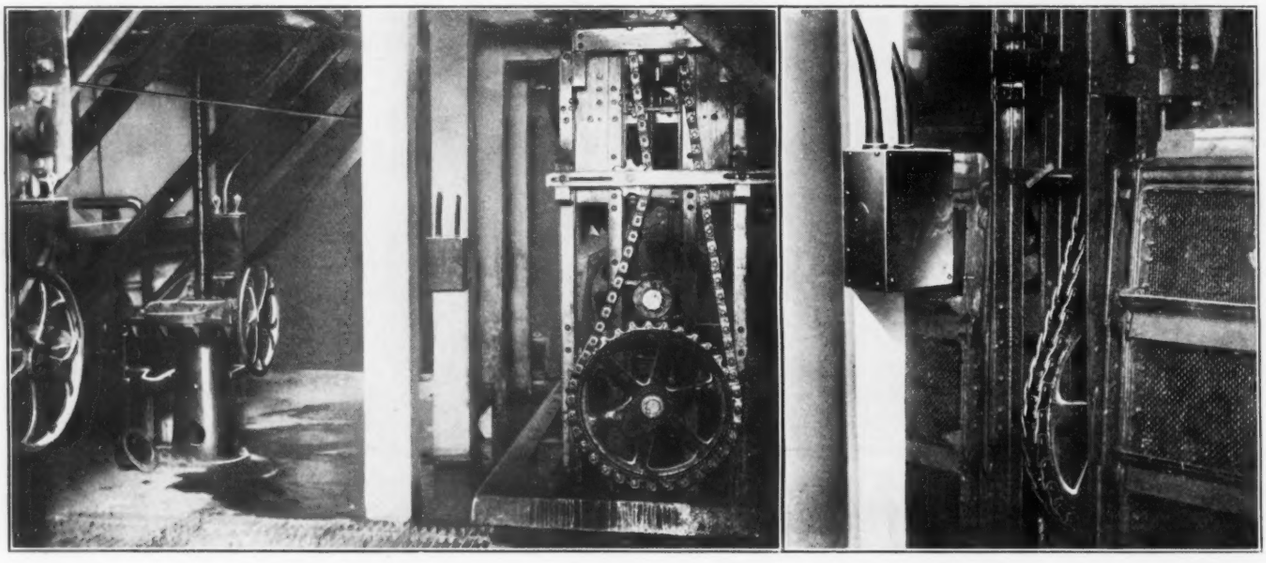
Modernizing Fifteen-Year-Old Steam Plant

Second Installment of a Series of Articles on the Rehabilitation of the Ashley Street Station of the St. Louis Company—Features of New Circulating-Water System and Method of Construction

BY JOHN HUNTER

Chief Engineer Union Electric Light & Power Company

THE effect that growth of load and developments in steam and electrical equipment have had on the Ashley Street station of the Union Electric Light & Power Company, St. Louis, Mo., was outlined in the Aug. 4 issue of the ELECTRICAL WORLD, attention being called to additions and changes which are under way to make the plant a modern steam installation. In this issue the features of the circulating-water system which is being installed for the condensers will be described and methods of overcoming certain construction difficulties will be discussed.



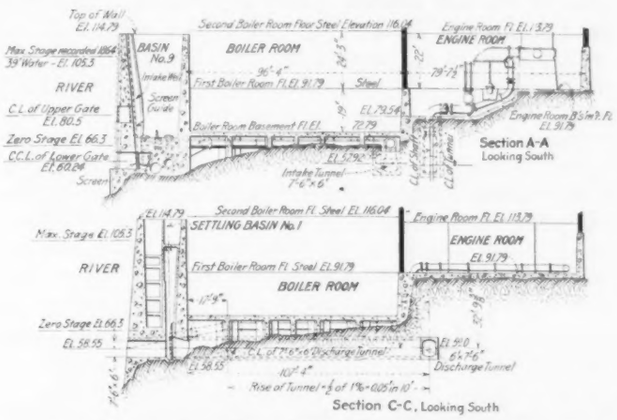
FIGS. 1 AND 2—SLUICEGATE-OPERATING STANDS, AND VIEWS IN REVOLVING-SCREEN ROOM

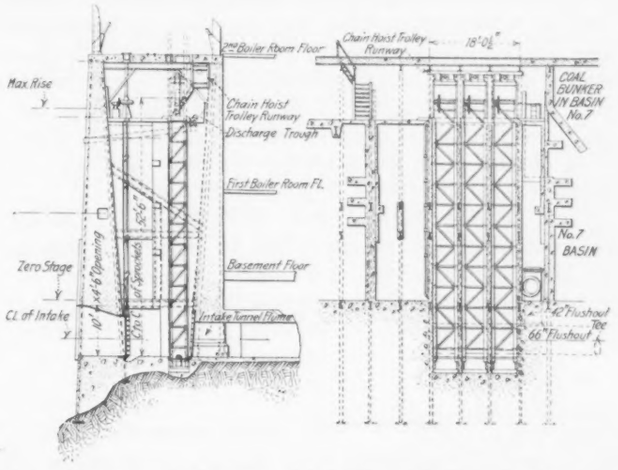
All of the condensing equipment for the generating units in this station is supplied with water pumped directly from the Mississippi River, upon the banks of which the station is situated. The original circulating-water intakes consisted of openings through the east river wall of the building, there being two gates in each of the two intakes, the upper for use during high stages of the river and the lower for use during lower stages of the river. Thirty-six-inch and 42-in. (91.4-cm. and 106.6-cm.) pipes carried water from these intakes across and below the basement of the boiler room and supplied water to a common 54-in. (137.1-cm.) suction header. This header was connected with the suctions of two 70,000,000-gal. (264,973,300-l.) centrifugal pumps, which in turn supplied cooling water to the surface condensers through a common discharge header. Tandem-compound engines rated at 1000 i.hp. drove the centrifugal pumps.

In extending the station three additional 25,000-kva. turbines are being installed. The condensers serving these units each have 40,000 sq. ft. (3716 sq. m.) of

cooling surface, requiring 50,000,000 gal. (189,266,000 l.) of circulating water per day under full load and with normal river temperature. To supply this additional 150,000,000 gal. (567,800,000 l.) per day necessitated the rearrangement of the circulating-water system and involved the building of new intakes.

The arrangement decided upon involved the abandonment of the old discharge lines which return the circulating water from the condensers to the river. This


Top of Wall El. 114.79
Second Boiler Room Floor Steel Elevation 116.04
Engine Room Fl. El. 113.79
BASIN No. 9
BOILER ROOM
ENGINE ROOM
Max. Stage recorded 1864 39 Water - El. 105.5
RIVER
First Boiler Room Fl. El. 91.79
Steel
C.L. of Upper Gate El. 80.5
Zero Stage El. 66.5
C.L. of Lower Gate El. 60.04
Boiler Room Basement Fl. El. 77.79
Engine Room B.S.M.T. Fl. El. 91.79
Section A-A Looking South
Intake Tunnel 7'-6" x 6'
Screen
SETTLING BASIN No. 1
Max. Stage El. 105.3
Second Boiler Room Fl. Steel El. 116.04
Engine Room Fl. El. 113.79
First Boiler Room Fl. Steel El. 91.79
El. 58.55
C.L. of 7'6" x 6' Discharge Tunnel
Discharge Tunnel
Rise of Tunnel = 5/8 of 1% = 0.05 in 10'
Section C-C, Looking South



FIGS. 3 AND 4—CROSS-SECTIONS THROUGH INTAKE AND DISCHARGE OPENINGS TO RIVER AND REVOLVING SCREEN ROOM

was made necessary because the river end of these pipes was in the exact location at which new intakes could be placed to best advantage. Moreover, these outlets were at a point too far upstream with reference to the general arrangements of intakes, the logical point for the outlet being at the extreme down-stream end of the plant. Therefore the new circulating-water discharge was made of such size and installed in such a position that it would carry all of the water from all generating units to the river at the extreme down-stream end of the plant.

It was early decided that all new circulating-water lines should be tunneled through solid rock which underlies the station, these tunnels to be lined with reinforced concrete as the nature of the rock would require. The discharge tunnel was built first. Construction shafts were first sunk at suitable places in the boiler room and the tunneling in the rock was carried forward almost to completion without connection with the river end.

Practically all portions of the tube, whether open-cut or tunnel sections, were lined with a 12-in. (30.4-cm.) reinforced-concrete coating next to the rock. Inside this was applied a four-ply waterproofing membrane made of high-grade roofing paper mopped into place with hot asphaltum. On this membrane was then poured a 4-in. (10.2-cm.) reinforced-concrete lining designed to protect the waterproofing and take up all manner of wear within the tunnel.

The concrete for the tunnel lining was mixed in the boiler-room basement, delivered to a 1-yd. (0.76-cu. m.) bucket carried on rails within the tunnel and poured therefrom by hand into the forms. The concrete for the roof of the arch, after having been thoroughly tamped into place and allowed to set, was found to have settled away from the roof of the rock, leaving a gap in some cases 0.25 in. (6.4 mm.) wide. This opening was filled and the bond between the roof of the lining and the rock assured by use of a cement gun. At intervals of about 10 ft. (3 m.) a 2-in. (5.1-cm.) hole was drilled in the roof of the tunnel and thin grout forced into the openings under 60 lb. (4219 gm. per sq. cm.) air pressure.

The construction costs on this tunnel were approximately as follows: Excavation per linear foot, $14 ($46 per m.); concrete linings per linear foot, including forms, $5.50 ($18 per m.).

At the same time excavation was being carried on beneath the building, work on the river end of the discharge tube was being pushed forward. This involved the building of a chamber which would accommodate a 6-ft. by 8-ft. (1.8-m. by 2.4-m.) sluicegate and extensive dredging and excavation of the riverbed for the tunnel outlet.

The method followed in cutting through the river wall was somewhat novel. An open caisson was sunk on the river side of the outer wall to a depth of approximately 40 ft. (12.2 m.) below the water level. The edges were heavily cushioned so that when brought up tightly against the outer concrete wall a watertight joint would be formed. Pumps were installed inside the caisson, and when all preliminary work had been completed and the water withdrawn the tunnel was extended into the caisson.

One of the most difficult operations in connection with the new discharge tunnel construction was the cutting over of the four 12,000-kw. condenser discharge lines into the tunnel without interrupting electric service. The work of removing portions of the old headers and replacing them with other pipe and connections to the new tunnel had to be done between 1 a. m. on Saturday and 4 p. m. on the following day. One seam of rivets in each of the elbows was left undrilled as a precaution in case of misfit. Drawing up of the plates, drilling of new holes and driving of rivets occupied a large portion of the available time.

This discharge tunnel, which runs practically the full length of the station, lies 33 ft. (10.1 m.) below the level of the old basement floor. While driving this tunnel it was necessary to blast out shafts and insert castings for the reception of future discharge connections from the new turbines. The suction tunnel from the new intakes into the new suction headers is approximately at the same elevation as the new discharge tunnel, both of which are about 10 ft. (2 m.) below the suction header of the old circulating-water system.

In building the new intakes advantage was taken of

the two walls around the plant to accommodate nine compartments which would serve as settling basins for the water purification system. One of the basins was used as a screen chamber for the new intakes. Through the outer walls two new intake openings were blasted in a manner similar to that employed in making the discharge tunnel, using the same caisson. On the outside of the openings heavy bar screens were built, the function of which is to keep out any heavy material or driftwood floating along the river. Inside of the same wall were installed two heavy sluicegates, measuring 6 ft. by 8 ft. (1.8 m. by 2.4 m.). These gates open into the screen chamber proper, which was formerly a settling basin. Three revolving screens spanning the intake tunnel are installed in this chamber.

Since, as mentioned before, the discharge from the old circulating-water system was in close proximity to the site selected for the new intakes, piping was so laid out and connected that it is now possible to discharge water from either one of the circulating-water systems

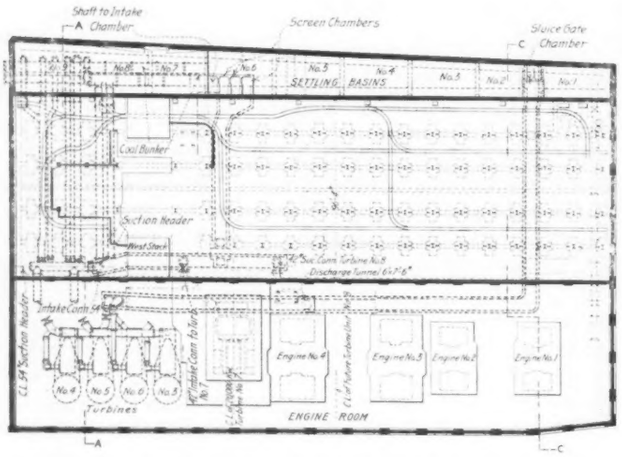


FIG. 5—ARRANGEMENT OF CIRCULATING-WATER PIPING

back through the intakes of the other system, thereby flushing out all the drift or sand which is suspended in the river water in great quantities.

The new suction tunnel, besides being situated in such a place as to furnish water to the three new 25,000-kva. turbines, was connected at one end of the cross tunnel to the 54-in. (137.1-cm.) suction header of the old system. It is thus possible to supply water to any or all of the generating units in the station through either of the suction intakes. The elevations of the suction tunnels are such that it is possible to supply water to the circulating pumps when the river is 8 ft. (2.4 m.) below the zero stage. The lowest stage of the river which has ever been recorded in the St. Louis district is 4 ft. (1.2 m.) below zero. Hence the station is well protected against possible interruption of circulating-water supply through low stages of the river. The suction tunnel is designed for a maximum flow of 5 sec.-ft. (0.14 cu. m. per second) while pumping the maximum quantity of 300,000,000 gal. (1,135,600,000 l.) per day. This quantity of water is approximately three times the amount used by the entire city of St. Louis for all purposes.

The revolving screens used in connection with the new installation are mounted on 53-ft. (16.2-m.) centers, these screens being at the time of their installation the longest that had ever been built for such purpose. The necessity of such large units was due in this case to the wide range in the stage of the Mississippi River at St. Louis, this varying from —4 ft. (—1.2 m.) to +36 ft. (+10.9 m.), changes as rapid as 6 ft. (1.8 m.) in one hour having been experienced. The original intakes of the station were equipped with screens mounted in frames which were lifted and lowered by means of motor-driven cables, there being a pair of screens in front of each intake gate. The operation of the new screens, however, is so successful and they fulfill the objects for which they were built so well that it is anticipated the old sliding screens will be replaced by more modern revolving screens at an early date.

One of the interesting features in connection with the operation of the new discharge tunnel is the fact that a very marked siphon effect is obtained which reduces the power required to drive the circulating-water pumps to an almost negligible quantity. During the extremely low stages of the river, however, it has been found that this siphon is less effective owing to the carrying in of considerable quantities of air with the circulating water. At the higher stages of the river this action is not noticeable.

The revolving screens were made by the Chain Belt Company, Milwaukee, Wis., the grouting machine by the Ransome Concrete Machinery Company, Dunellen, N. J., and the circulating pump by the Wheeler Condenser & Engineering Company, Carteret, N. J., which also furnished the condensers and condenser auxiliaries. The circulating-water pump, which is driven by a turbine made by the Kerr Turbine Company, Wellsville, N. Y., is the single-runner type designed for 3600 gal. (13,627 l.) a minute against a head amounting to 30 ft. (9.1 m.).

Other features of the Ashley Street station will be presented in subsequent issues of the ELECTRICAL WORLD.

A Lamp Filament for Motion-Picture Machines

Because in any faint source of light the rays entering the condensing buses necessarily form a conical beam, Albert S. Moffat of Belmont, Mass., proposes, in patent No. 1,222,119, to dispose an incandescent-lamp filament in a hollow pyramidal form the base of which is similar in contour to the picture space to be illuminated, and to have the filament composed of a long helix wound in a spiral about such a pyramid.

To this end the filament will not only intensify the light emitted therefrom but will concentrate it upon the rectangular space occupied by a motion-picture section. In the usual form of light the rays issue in the shape of a cone whose base is circular and consequently must lap over the rectangular picture space to an extent fully equal in area to that of the space utilized. By having the filament in a helix a maximum of light rays is obtained in the minimum of space. By having the helix wound as a hollow pyramid the emitted rays are concentrated upon a smaller space than would be the case were the helix coiled in a single plane parallel with the plane of the picture. This is because the rays from the inner winds can pass the outer winds only by issuing in a straight line within the outer winds, and so on to the film, conforming in contour to the rectangular shape of the picture.

STATION AND OPERATING PRACTICE

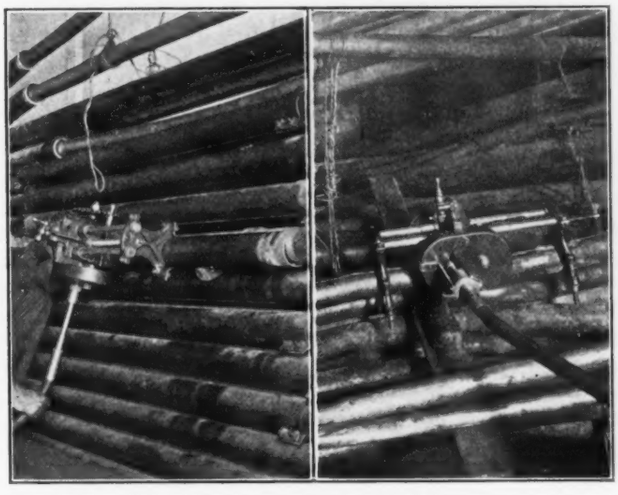
A Department Devoted to Problems of Installation, Operation and Maintenance of Equipment for Economical Generation and Distribution of Electrical Energy

REMOVING IRON PIPES FROM ENERGIZED CABLES

Tool Consists of a Hand-Operated Key-Seating Machine Which Is Similar to a Portable Milling Machine

BY W. R. DEYO

Conditions sometimes arise in cable work where it is desirable to remove the conduit from cables without purposely or accidentally interrupting service through the cable. Such conditions arise when a new manhole is built over existing pipes in a subway run, or in cable



REMOVING CONDUIT FROM CABLE IN TWO DIFFICULT POSITIONS

vaults where the pipes extend directly from the manhole to the distributing point or bus, as the case may be.

Several methods for removing such pipes have been tried, but have been found objectionable for various reasons. Either the process was slow and expensive or the cables were exposed to serious mechanical injury. Probably the first method employed was that of the "cape chisel" and hammer, the chief objection to which was its slowness and consequent expense. Another method is the use of a tool which works on the principle of a can opener. This tool is very satisfactory for removing 3-in. (7.6-cm.) iron pipes containing small cables where there is enough clearance between the pipe and cable to allow the cutter to enter without denting or damaging the lead cable sheath. It can be used successfully on cables where the clearance between pipe and cable sheath is ¾ in. (1.9 cm.) or greater.

The oxy-acetylene process has been used with considerable success in certain cases. However, the liability to burns, in spite of asbestos and copper shields, is so great that concerns specializing in this type of work will not guarantee their work to be free from damage to cable sheaths.

The company with which the writer is connected is using a tool which consists primarily of a hand-operated key-seating machine. This tool is nothing more or less than a portable milling machine with an adjustable head for raising or lowering the cutter to the desired depth and a lateral feed for moving the cutter along the length of the pipe, which can be operated either by hand or automatically. This machine can be adapted to motor drive by means of a flexible shaft and a gear reduction. A carbon-steel slotting cutter 2½ in. by 3/64 in. (6.4 cm. by 1.2 mm.) ground on the sides for clearance is very satisfactory, but a wider cutter can be used satisfactorily if desired.

The maximum permissible peripheral speed of carbon-steel cutters in wrought iron is approximately 70 ft. (21.3 m. per minute). A ½-hp. motor is sufficiently large for operation, but motors of this size usually have a speed of about 1800 r.p.m., so that a gear reduction of sixteen to one is necessary to give the proper speed to the cutter. At the above speed the machine will remove about 3 ft. (0.9 m.) of pipe per hour. With high-speed steel cutters the operation can be speeded up considerably, but it is almost impossible to obtain them at present. In localities where power is not available, the machine can be operated by hand at a fairly good rate of speed. Several hundred feet of pipe have been removed from working cables by this company without a single interruption of service or even a scratch on a cable sheath due to the cutter.

KNOWING MOTOR LOAD IS AN IMPORTANT MATTER

Individual Ammeters Are Not Necessary for Each Motor Circuit if Provision Is Made for Temporary Connection

BY J. A. HORTON

No purchaser of an electric generator hesitates to pay for an ammeter by means of which he may know the current that his machine is carrying. When it comes to buying an ammeter for a motor, however, "that is another story." Perhaps this averseness or rather indifference to knowing what a motor is doing is due to there being so many more motors than there are generators, the hasty assumption being that each motor would require its own ammeter. Such is not the case. Suitable and inexpensive provision can be made on each motor circuit so that a portable ammeter can be temporarily cut into that circuit without interrupting operation. One simple way is to tap both terminals of one set of fuse clips so the portable ammeter leads may be connected thereto and the fuse then removed. Of course it would be advisable to fuse the ammeter circuit for the same value as the circuit, but this is not absolutely necessary, as the other fuse or fuses in the same circuit may be depended on for protection. A short-circuiting switch is advisable to protect the in-

strument from heavy starting currents, even when it is installed permanently. The switch should be kept closed except when it is desired to read the current.

An instance where such a device would have saved money is cited below: An old-style two-pole, compound-wound, 500-volt generator had been used as a shop motor for years. Beginning with one lathe, a drill press, a banding machine and a field coil winder, lathes, banding machines, slotters, coil machines, presses and a vacuum fan had been added without any thought of the ultimate capacity of the motor. One day it was noticed that the armature was smoking, and it occurred to some one to measure the current. This was done and the current was found to be 75 per cent more than the rating of the motor. The armature was left in service, but was relieved of some of its load by applying individual motors to several of the connected machines.

MEASURING LEAKAGE AND CHARGING CURRENTS

Method Employing Ordinary Instruments Available for Determining Suitability of Rubber Gloves and Insulators

BY W. B. BUCHANAN

The leakage and charging currents in rubber gloves and insulators are very small in value even at high voltages, so unless special instruments are available for measuring them directly other less direct methods must be employed. The following method was developed to obtain results by means of instruments in common use.

The apparatus employed consisted of a 25-cycle, 110-220/16,500-33,000-volt testing transformer, a 150-volt voltmeter, ammeters of 1-amp. and 3-amp. range, and a 2-amp., 150-volt wattmeter. A 110-volt exploring coil on the transformer supplied potential to the wattmeter and voltmeter, while the current coils of wattmeter and ammeter were connected in the primary and short-circuited by a knife switch at all times except when the meters were being read.

To use the apparatus the values in the low-tension side are read first with the high-tension open-circuited, then with the gloves or insulators between terminals. The change in the resulting readings in the primary is due to the load only and is the low-tension equivalent of the high-tension current change. In this case the voltage ratio of the transformer was 300 or 150.

With load the increase of the power component of current, as shown by the wattmeter, above that obtained with the same exploring coil voltage on open circuit is the primary equivalent of the leakage current on the high-tension side, while the reduction in the wattless component that is due to the load is the primary equivalent of the charging current. On account of the fact that the exciting current at no load has a very large wattless component, a very small charging current may be detected and measured accurately enough for comparative purposes. The leakage-current measurement depends mainly on the sensitivity of the wattmeter and personal errors in observation.

An example worked out from the results of an actual test will serve to illustrate the method: From readings taken on open circuit the values of 0.64 amp. and 33.4 watts were obtained with an exploring-coil voltage of 66.7 volts corresponding to a high-tension voltage of 10,000 volts. With a 12-in. (30.5-cm.) rubber glove subjected to a 10,000-volt water-to-water test, the readings were found to be 0.563 amp. and 35 watts.

The power component of primary current at no load was $33.4/66.7 = 0.501$ amp. and at full load $35.0/66.7 = 0.525$ amp. Hence the actual leakage current in high-tension side was $(0.525 - 0.501)/150 = 0.024/150 = 0.00016$ amp. The leakage current could have been obtained by dividing the increase of watts input by the high-tension voltage, thus $(35 - 33.4)/10,000 = 0.00016$ amp.

The wattless lagging component due to exciting current on open circuit is $\sqrt{0.64^2 - 0.501^2} = 0.398$ amp. That due to exciting current on load is $\sqrt{0.563^2 - 0.525^2} = 0.202$ amp. The difference, $0.398 - 0.202 = 0.196$ amp., is the low-tension equivalent of the charging current in the high-tension side, hence its value at 10,000 volts is $0.196/150 = 0.0013$ amp.

These results are quite consistent with those given by C. W. Ward, in the May 12, 1917, issue of the ELECTRICAL WORLD. Two gloves which had slightly greater leakage current stood the 10,000-volt test for one minute, but as the wattmeter showed slight increase in readings at this time, the voltage was continued until at the end of three minutes the gloves punctured. It appeared from these results that a leakage current in excess of that usually obtained for the given type of gloves indicates a local weakness which causes failure.

This method was also used to obtain corresponding results on telephone insulators, with very satisfactory results. At 15,000 volts and 25 cycles the measurements indicated 1.2 to 1.7 watts loss on different types of insulators and a charging current of 0.0013 amp.

For exact measurements the wave form of voltage supplied should be very close to the sine wave, but for comparative tests, where the same supply is used, this requirement is not so essential.

PORTABLE HOIST DESIGNED FOR HANDLING STATION APPARATUS

Mounted on Carriage and Driven by an Electric Motor, It Is Used to Handle Substation Apparatus and Transformers

To facilitate the handling of substation apparatus and transformers a portable electric-motor-driven hoist or winch was developed by the Puget Sound Traction, Light & Power Company, Seattle. This device consists of a 7.5-hp., 600-volt direct-current motor geared to an intermediate shaft through two-gear ratios and mounted on a channel-iron truck. A clutch is provided on the intermediate shaft for operating the main drum. By means of the gear ratio a rope speed of from 10 ft. to 30 ft. (3.05 m. to 9.1 m.) per minute is obtainable. By means of the clutch on the intermediate shaft the main drum may be disengaged and the niggerhead used independently. The winch is provided with two heavy forged hooks that are used for anchoring it. A 600-volt direct-current motor was used on account of the accessibility of the 600-volt direct-current energy supply in all parts of the district served. This hoist was described by C. F. Terrell of the Puget Sound Traction, Light & Power Company at the recent annual convention of the Northwest Electric Light & Power Association at Spokane, Wash.

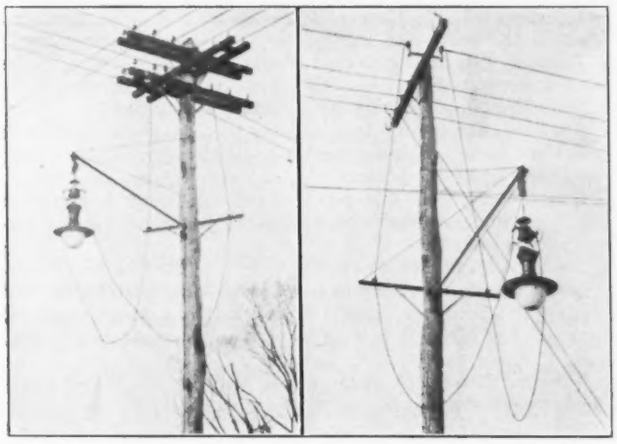
STURDY MAST ARMS FOR STREET LAMPS

Lamp-Supporting Arm Made of Pipe and Guyed from Angle-Iron Cross-Arm Carrying Insulators for Risers from Lamp

BY N. NESBITT TEAGUE

Augusta-Aiken Railway & Electric Corporation, Augusta, Ga.

For supporting its street arc lamps the Augusta-Aiken Railway & Electric Corporation uses mast arms made of galvanized pipe, the horizontal guys for which



CONSTRUCTION EMPLOYED FOR SUPPORTING STREET LAMPS

are fastened to the ends of an angle-iron cross-arm. The latter also supports insulators for the lamp circuit, as shown by the accompanying illustration. The angle-iron cross-arm is 2.5 in. by 2.5 in. by 6 ft. (6.4 cm. by 6.4 cm. by 1.8 m.). Angle iron used for a cross-arm has a neater appearance and is stronger than the wood cross-arm which was formerly used. The iron is drilled to hold Locke pins, which hold the insulators for attaching the loops to the lamp.

The pipe is purchased in the district, the fittings being the only standard parts. The cost of these mast arms is very reasonable. All mast arms, mast-arm cables and pulleys are grounded, the ground wire extending down the side of a pole and terminating in a 6-ft. (1.83-cm.) pipe driven into the ground at the foot of the pole. This work was carried out under the direction of J. J. Borger, general superintendent of the electrical department.

POWER NEEDED BY MOTORS IN WOODWORKING PLANT

Tests of Machines Each Equipped with More Than One Motor Illustrate Fluctuating Character of Load

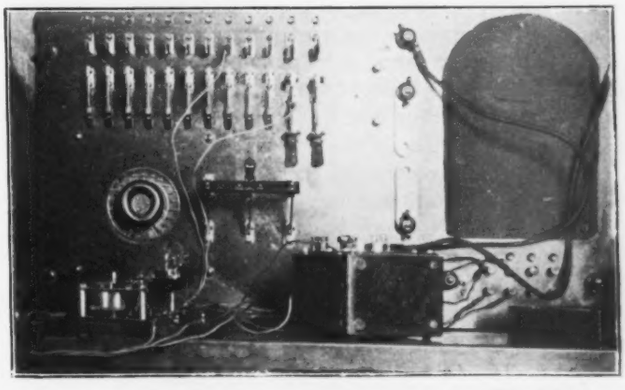
In the factory of the Rockwell Manufacturing Company, a woodworking concern in Milwaukee, tests were made on two machines in the company's plant, each of which is equipped with more than one driving motor. The first test was made on a 30-in. (76.2-cm.) Whitney planer, equipped with two 5-hp. motors. Each motor consumed 1.1 kw. driving the machine idle, the load rising to approximately 1.15 kw. per motor when the feed was started. The spindle speed of the planer was 3550 r.p.m. When the planer was taking a 1/16-in. (1.58-cm.) cut from four pieces of hard wood 2 ft. (60.96 cm.) in length each motor consumed 2 kw. The spindle speed of the machine at that time was 3500 r.p.m. There were occasional momentary surges to 3 kw. on each motor, but the load was fairly steady at 2 kw. during the cut. When the planer was operating with high-speed feed, taking a 5/16-in. (7.93-cm.) cut from a piece of maple 22 in. (55.88 cm.) wide, with a spindle speed of 3200 r.p.m., the motors took 6.5 kw. each, the load occasionally rising sharply to 10.5 kw. When this cut was diminished to ¼ in. (6.35 cm.) with the high-speed feed the load was 6.5 kw., occasionally rising sharply to 9.5 kw. for each motor connected.

The other test was made on a three-drum, 66-in. (167.64-cm.) door sander, equipped with four motors. The 7.5-hp. motor attached to drum No. 1 consumed 1.2 kw. driving the drum idle. During the sanding operation the power consumption caried from 2.5 kw. to a trifle over 4 kw., but it was fairly steady during the majority of the time, being between 3 kw. and 4 kw. The 7.5-hp. motor driving drum No. 2 consumed 1 kw. driving the drum idle and required from 2 kw. to 8 kw. while operating the drum under load. The 7.5-hp. motor operating drum No. 3 consumed 1 kw. with the machine idle and took from 1.5 kw. to 5 kw. during the sanding process. The 2-hp. motor which operates the feed required 0.3 kw. for driving the feed idle and 0.5 kw. under load.

TESTING ROTATING STANDARDS

Contact Device on Clock Operates Relay Which Controls Potential Circuit of Tested Meter

A contact-making clock which has a one-fifth second movement has been developed in the meter shop of the Northern New York Utilities, Inc., of Watertown, N. Y., to help in testing rotating standards against a standard indicating wattmeter. When the clock makes contact it excites a relay which closes and opens the potential circuit of the rotating standard at the beginning and end of a stated time, or one minute. Before this device was used it was found almost impossible to obtain two timings alike, owing to the fact that the time had to be checked by a stop watch and because the switch in the potential circuit had to be opened by hand.



CONTACT-MAKING CLOCK BEING USED WITH ROTATING STANDARD

This apparatus was devised by H. H. Devereaux of the meter department of the company.

CENTRAL STATION SERVICE

A Department Devoted to Commercial Policy and Management Topics, Including Applications of Electric Light, Power and Heat

RATES PER KILOWATT-HOUR FOR LIGHTING OF PARKS

Bureau of the Census Publishes Data for 1916 Concerning Eighteen Cities Which Have Metered Electrical Service

The rates per kilowatt-hour for metered electric energy for park lighting in certain cities have been ascertained by the Bureau of the Census and published in the general statistics of cities for 1916. Only eighteen cities state the rates now in force, as shown in the accompanying table. Differing conditions and restrictions in lighting contracts may account for some of the variations in rates. These may be affected by franchise considerations or street privileges or other matters of a similar nature.

City	Rate per Kw.-hr.	City	Rate per Kw.-hr.
St. Louis, Mo.	$0.03¾	Wilmington, Del.	$0.05
Baltimore, Md.	0.02	Oklahoma City, Okla.	0.06
Los Angeles, Cal.	0.04	Peoria, Ill.	0.04
Buffalo, N. Y.	0.07	Wichita, Kan.	0.05
Seattle, Wash.	0.03½	El Paso, Tex.	0.08
Portland, Ore.	0.02¼	York, Pa.	0.10
Toledo, Ohio	0.05	Topeka, Kan.	0.05-0.07
Dayton, Ohio	0.04	Colorado Springs, Col.	0.03
Kansas City, Kan.	0.06	Zanesville, Ohio	0.03

DATA FROM NORTHWEST ON ELECTRIC WATER HEATING

Sub-Committee of Northwest Electric Light & Power Association Reports Interestingly on This Subject

One of the drawbacks to the electric range is the matter of heating water electrically at a cost low enough to give satisfactory service. Considerable attention is being paid to this phase of electric cooking on the Pacific Coast, and a rather comprehensive report was made by the sub-committee on electric water heating at the recent annual convention of the Northwest Electric Light & Power Association.

Replies received to a questionnaire from thirteen companies operating in Washington, Oregon and Idaho were as follows:

Question No. 1—Are you heating water electrically?

Answer—Four, no; nine, yes.

Question No. 2—What is your rate?

Answer—One, a meter rate of 3 cents less 10 per cent, and eight flat rates ranging from $3 to $6 per kilowatt per month.

Question No. 3—What size and types of heaters are you using?

Answer—Nine, non-automatic circulation, varying from 1 kw. to 5 kw.; six, non-automatic immersion, varying from 0.5 kw. to 2 kw.; one, automatic immersion, varying from 1.5 kw. to 3 kw.; one, plaster type, no capacity given.

The non-automatic circulation type of small capacity seems to have been used the most extensively and the non-automatic immersion next. The consensus of opinion seems to be that since the heaters are operating on a flat rate the small capacity non-automatic circulation type is the most popular under these conditions.

Question No. 4—How many installations have you and what is the connected load?

Answer—Stations reported a total of 1930 heaters in use with a connected load of 3560 kw.

Question No. 5—Are your consumers satisfied?

Answer—Five, yes; two, mostly yes, in some cases no; one, have been unable to meet all demands with 1500 watts; one, very little complaint.

Question No. 6—Are you connecting water heaters on double-throw switches with ranges to prevent both operating at one time?

Answer—Five, yes; four, no.

Question No. 7—Are you insulating boilers, and how?

Answer—Five, yes, with J-M felt and Keystone; one, yes, with good covering top with wool; two, in some cases; one, no.

Question No. 8—In your opinion will electric water heating increase the popularity of electric cooking?

Answer—Eight, yes; one, no.

Question No. 9—Do you do wiring for water heaters yourself or sublet it to wiring contractors?

Answer—Five, place some with contractors and do some themselves; three, let all to contractors; one, does all.

Question No. 10—If sublet to contractors, please outline your arrangement with them for doing the work?

Answer—One, pay them cash for installation; two, get bids, awarding to lowest bidder; two, all work done time and materials; one, get material at cost and allow regular time; one, get bids, submit them to consumer, if accepted company pays bill and extends credit to consumer.

Question No. 11—Does the price at which you sell water heaters include wiring and installation?

Answer—Two, no; seven, yes.

Question No. 12—What is the average cost of plumbing connections to average household boiler?

Answer—Cost varies from $2 to $7.50.

Question No. 13—What percentage of your water-heater consumers continue the service for twelve months of the year?

Answer—One reported 100 per cent; one, 90 per cent; one, 60 per cent; three, 50 per cent; one, none; one, not yet determined.

Question No. 14—What additional annual revenue do you secure from ranges equipped with water heaters?

Answer—One, from $24 to $72; one, $42 per kilowatt; one, $36 per kilowatt; one, $20; two cannot determine.

Question No. 15—What success have you had in heating water for public baths, barber shops, and other commercial installations?

Answer—Two report no installations; three, small barber shops very successful; two, barber shops, fire engines and small hotels all very satisfactory.

Question No. 16—What is the most frequent complaint from consumers in regard to type of water heater you install?

Answer—One reports that induction heater hums and all too slow to bring water up to desired temperature when much hot water has been drawn off; one, trouble with heaters filling up with lime; two, breakdowns and leaks; two, no troubles; one, circulation type, no circulation, "plaster" heater too slow; two, not sufficient hot water.

Question No. 17—What steps are you taking to remedy these troubles?

Answer—One is insulating boilers and increasing size of heaters; one is making more careful investigation of con-

sumers' requirements; one is restricting circulation to raise temperature; one is making repairs to get heater back in service as soon as possible.

Question No. 18—Do you replace burned-out heater elements free of charge?

Answer—(a) During manufacturer's guarantee period, seven, yes; one, no. (b) After the guarantee has expired, one, yes; six, no; one, no burnouts; one, undecided.

Question No. 19—Has your company had experience from electric water heaters going to ground during lightning storms?

Answer—Two, yes; seven, no.

Question No. 20—Have you installed lightning protection ahead of your heaters?

Answer—All, no.

Question No. 21—Have you had trouble with heaters clogging up with scale, and what remedy have you applied?

Answer—Four, no trouble; one, has not solved the problem yet; two, remove and clean heaters.

Question No. 22—With regard to the immersion heaters, has the scale on any of them become so heavy that the heaters could not be removed from the boiler?

Answer—Six, no; one, yes.

IMPORTANT RATE RECOMMENDATIONS

In the matter of rates the committee had some very pertinent recommendations to make. It said:

Judging from the replies received from the stations of the Northwest, it would appear that the general practice to date in this territory has been to make a certain meter rate for cooking and a flat rate for water heating, which would not seem to be the best way of handling the business, as it has several disadvantages: First, it is wasteful of energy, as it encourages the installation of small-capacity non-automatic water heaters which are allowed to operate continuously whether needed or not, and with these small heaters attached to the ordinary 30-gal. (113.5-l.) boiler it is not always possible to maintain a sufficient supply of hot water for all requirements. Second, it does not allow the use of kitchen or other house heaters, as the cooking rate is usually too high for that purpose.

It would seem that the correct method of handling the matter would be a sliding scale block rate, either to include the lighting or not as desired, but so designed that the average lighting be covered by the first step, the cooking by the second step, and the water and air heating by the third step, or if the lighting is not to be included eliminate the first step. It is also desirable to use a yearly minimum rather than a monthly minimum. For ordinary cases the minimum really is of no consequence, but it often has a pronounced effect upon the prospective customer at the time of making the sale, and with a properly designed yearly minimum the station is fully protected. Everything should be done to make the matter appear as simple and attractive to the consumer as possible, and all complications and deeply theoretical rates should be avoided.

SOME OTHER SUGGESTIONS

Further recommendations of the committee follow:

It is believed the water-heating problem is of such magnitude as to require serious study by each station, and each installation should be given more or less attention, for the reason that the requirements vary so greatly. Owing to the differing climatic conditions, water cost of supplying energy, and costs of other fuel, it is difficult if not impossible to make up a set of instructions that can be followed and expected to produce perfect results in every case.

It is believed, however, that in general the following outline will cover a large proportion of the requirements. It is no doubt a fact that a thoroughly reliable thermally controlled circulation-type heater is the most satisfactory for ordinary residence purposes, provided the rate for energy will allow of its use, for the following reasons:

First—The majority of residences demand hot water at a number of faucets throughout the house.

Second—A large percentage are already equipped with 30-gal. or 40-gal. (113.5-l. to 151.4-l.) range boilers which cannot be changed.

Third—It is desirable to have at all times a sufficient supply of hot water to meet all demands.

Fourth—If the heater is of the correct capacity to operate a large portion of the time, the load factor is good and there should consequently be a low rate for energy. This is especially true if the heater be connected on the opposite side of a double-throw switch from the range.

ASKS FOR CO-OPERATION IN EDUCATION OF SALESMEN

Committee of the N. E. L. A. Commercial Section Urges Immediate Action to Spread Advantages of Courses

Co-operation from executive officials of member companies is of much value to the committee on education of salesmen of the Commercial Section of the National Electric Light Association in carrying out its program this year. Already the committee is greatly encouraged by the prospects for enrollment. Its members have given time freely to the development of the work and feel that the courses offer splendid opportunities for employees who can benefit from further educational advantages. They feel that the co-operation of officials is desirable in the initial step of acquainting employees with the importance of the courses and that study can be encouraged best by those who are in closest touch with the men and women whom the work is designed to benefit.

Fred R. Jenkins, Chicago, chairman of the committee, has made the following statement at the request of the ELECTRICAL WORLD in regard to the outlook for this year:

We are publishing four courses, using the correspondence method, for members of the association and employees of member companies. These courses include the commercial engineering course, prepared particularly for men in the commercial departments or those requiring a commercial training course to prepare them for the business.

The course in practical electricity is designed for all employees who enter the business without a technical education, giving them an elementary course in the fundamentals, and particularly adapted for the members of our association.

The elementary course in bookkeeping and accounting is given as a preparation for the advanced course in electric utility accounting. In the preparation of this advanced course the greatest care was taken. It specializes on accounting for electric utility corporations, following closely the N. E. L. A. classification of accounts.

The large response to the folder "Three Paths to Success," which was sent out recently by the association to all members would indicate that a large number of the member companies appreciate more than ever before the value of training courses, particularly at this time, especially prepared for them by the association.

It is in such times as these that both the companies and their employees appreciate the necessity of preparedness and special training, and the executives of member companies are taking advantage of our courses for this purpose, and we are urging every company to take immediate action in this matter.

It is found that where some executive of a member company, through the appointment of an educational director, takes an active interest in acquainting the employees with these courses no difficulty is experienced in organizing an enthusiastic class, and many of the companies have gone a great deal further, even to the extent of not only advancing the tuition fee, but agreeing to return a proportion of the tuition fee when the employees obtain certificates showing satisfactory completion of the studies.

It is expected that the member companies will take action in this matter, as the prices at which the association offers

these courses do not include any expense which would be incurred for selling purposes, other than the printed prospectus, and in order that they may be self-supporting to the association the co-operation of the member companies is absolutely necessary. The benefits received by these companies will be in proportion to the active interest they manifest. We anticipate a large enrollment this year.

ELECTRIC RANGE LINKED UP WITH FOOD CONSERVATION

Central Station Companies Point Out Ways to Save Nourishing Fats and Juices of Foods and Save the Fruit and Vegetable Crop

Conservation of food has now become a family byword, and efforts are being made in every direction to prevent waste. Central stations are co-operating with the national movement by showing the good economy of the electric range.

The Union Electric Light & Power Company of St. Louis, Mo., has taken the opportunity to link up electric cooking with the national food conservation program in the distribution of war bulletins, as is shown in the accompanying reproduction of a page from company literature. Here it is pointed out that in addition to economizing in the use of the common foods it is possible further to conserve the nourishing fats and juices of all foods by cooking in an electric range.

A number of companies have taken the opportunity offered by the food conservation campaign to advertise the electric range through canning demonstrations. The advertisement shown here gives an idea of how the range idea is subordinated to the national campaign. Some of these demonstrations are conducted in windows as shown in the accompanying halftone illustration, others have special spaces in the building set apart for them as stated in the advertisement, while others have sent out notices that a demonstration will be given before any woman's club upon request.

Photo by N. Y. Ed. Co.

NEW YORK EDISON COMPANY SHOW WINDOW DEMONSTRATION OF FOOD ECONOMY AND ELECTRIC COOKING

The Summit (N. J.) company follows this latter plan and reports a number of range inquiries as a result. In this case the company installs a meter at each demonstration and at the close tells the audience exactly how much the electricity to perform each bit of cooking cost.

FOR THE LEAN DAYS TO COME

¶ In our **BASEMENT APPLIANCE DEPARTMENT**, each day between 2 and 5 P. M., skilled women from the New York State Food Supply Commission will demonstrate the best means of **HELPING HOOVER** conserve the nation's food supply by preserving vegetables and fruits.

TUESDAY	WEDNESDAY
CANNING CORN SPINACH OR SWISS CHARD CUCUMBER PICKLES	CUCUMBER PICKLES (Sweet or Sour) CHUTNEY PEPPER RELISH VEGETABLES MIXTURES

¶ As this praiseworthy work is all done on a modern **ELECTRIC RANGE**, the demonstration possesses a double charm and an added **ECONOMIC SIGNIFICANCE.**

YOU ARE WELCOME

Buffalo General Electric Co.

TYPICAL FOOD-CONSERVATION ADVERTISEMENT OF THE BUFFALO GENERAL ELECTRIC COMPANY

U. S. War Bulletin No. 8

Advises observance of the following:

1. Eat one wheatless meal a day.
2. Eat beef, mutton or pork not more than once a day.
3. Economize in the use of butter.
4. Cut the daily allowance of sugar in tea or coffee and in other ways.
5. Eat more vegetables, fruit and fish.
6. Urge in the home or the restaurants frequented the necessity of economy.

To further conserve the nourishing fats and juices of all foods

COOK ON AN ELECTRIC RANGE

SUBORDINATING ELECTRIC RANGE ADVERTISING TO THE NATIONAL FOOD-CONSERVATION CAMPAIGN

ADVANCE IN TECHNICAL THEORY AND PRACTICE

Including a Digest of Important Articles Appearing in the Scientific and Engineering Press of the World

Lamps and Lighting

Development of a Permanent Street-Lighting Plan for a Small City or Village.—R. B. THOMPSON.—This paper describes the lighting work of one central station company after a close study of the principles and ideals of the Illuminating Engineering Society, and indicates work that can be accomplished in cities similar to the one described. The subject was discussed under the following headings: territory, highway lighting, lighting in cities, reason for street illumination, process of seeing, natural divisions of street illumination, types of equipment, illuminating engineering features, maintenance, principles adopted, plan adopted by the city, and results.—*Trans. Ill. Eng'g Soc.*, Aug. 30, 1917.

Generation, Transmission and Distribution

Interchange of Power.—E. C. STONE.—Emphasizes the advantage that can be taken of diversity factor when several systems are interconnected and cites a particular case in Pennsylvania, giving details of energy-exchange agreement, the load conditions on the systems interconnected, methods of operating to secure maximum economy and use of equipment, and tie-line conditions which give best results.—*Elec. Journal*, September, 1917.

Protecting Central Stations Against Short Circuits.—F. SCOUMANNE.—First part of an article describing electrical installations in Baku, Russia, and its environs that furnish energy to the naphtha industries of that region, with an account of some typical accidents due to short circuits on this system which have come under the author's observation. The author traces these occurrences to their cause and makes recommendations for guarding against their recurrence. He classifies the accidents as follows: A. Defects in the conductors, including (1) defects in the choke coils, (2) breaking off of the conductor supports, (3) defective connections at the busbars, and (4) defective connections in the circuit breakers. B. Accidents due to the oil circuit breakers. Of these several instances are given. The first cause of all these accidents resides in the great power exerted by alternators working in parallel; such occurrences are unknown in small and medium-sized central stations. At the moment when an alternator becomes short-circuited the current is limited only by the impedance of the armature resulting from ohmic resistance and self-inductance. In many alternators, even those of comparatively recent construction, the value of the short-circuited current rises at first to forty or fifty times that of the normal current, then descends progressively to about ten to twenty times this current. However, most manufacturers recognize the necessity of limiting the value of the short-circuited current to ten or twelve times that of the normal current, so that it rapidly descends to five or six times that value. In coming to the remedy for these short circuits two general means are suggested—to suppress the cause or to hinder its effects. Sometimes both methods can be tried at once. To suppress the cause the intensity of the short-circuited current must be diminished. Three plans are advocated: (1) to diminish the power of the machines installed where they are subject to this short circuit by dividing the total power of the central station into various independent groups; (2) to diminish the apparent power of the generators by raising the power factor of the installation; (3) to limit the short-circuited current by the insertion of reactors in the circuits. The only way to prevent mechanical effects from short circuit is to reinforce the fixation of the conductors—a means that, simple as it appears, is very complicated and hard to accomplish, because an insulator or connection which has withstood ten violent short circuits may fail the eleventh time. Moreover, the power generated by central stations is constantly increased, and the fixation which was sufficient yesterday is inadequate to-morrow. As to oil circuit breakers, the author does not concern himself greatly with explosions where the oil becomes ignited in the interior of the instrument—these are of rare occurrence with the new types of apparatus—but with the usual type of accident occurring to-day, in which when, following a short circuit, a circuit breaker is put out of commission the accident leaves the interior of the circuit breaker uninjured but damages the exterior and causes the walls of the cells to be burned and covered with grease. The oil circuit breaker is, the author holds, still an imperfect piece of apparatus and the cause of much danger. He describes recent improvements made in America and advocates that the circuit breaker be placed in the most favorable position possible to minimize the results of accidents and that unceasing vigilance be exercised in caring for it.—*Revue Gén. de l'Elec.*, Aug. 11, 1917.

Installations, Systems and Appliances

Automatic Operation of Bell Hoists for Blast Furnaces.—E. S. LAMMERS, JR., and C. H. HODGKINS.—Description of a method of using electric motors which has been made possible by recent developments in industrial controllers.—*Elec. Journal*, September, 1917.

Sphere Gaps for Lightning Arresters.—V. E. GOODWIN.—Discussion regarding the difference in dielectric spark lag between different electrodes under various conditions. As a result of experiments it was found that when an insulator, a horn gap, a needle gap and a sphere gap having spark-over potentials of 157 kv., 140 kv., 130 kv. and 170 kv. respectively were connected in parallel and a steep-front high-voltage impulse impressed, the discharge would take place in the sphere gap. The conclusion was reached that the time lag of insulation of apparatus should be made as great as possible while the time lag of the protective device should

be made as small as possible.—*Gen. Elec. Review*, August, 1917.

Electrophysics and Magnetism

Determination of Magnetic Flux Density and Permeability.—August Hund.—Method of studying test samples at any frequency. The samples to be tested are compared with a known and progressively variable self-induction, or "variometer," consisting of air-core coils in series with a non-inductive resistance. When the currents in the two branches of the system are equal in effective value and in phase their inductive effects on the secondary coil of the differential transformer will exactly neutralize each other, and no voltage will be induced in the coil. The two primary coils (P_1 and P_2) are symmetrically placed with reference to the secondary coil S, and have exactly the same number of turns, which are wound in opposite directions. Any kind of alternating-current detector connected across the terminals of the secondary coil will then give a no-current indication when the currents P_1 and P_2 are equal and in phase. A no-current adjustment is established when the coefficient of self-induction of the variometer is equal to the effective coefficient of self-induction of the test coil, and when the effective resistance of the test coil is also exactly balanced by the resistance of the variometer and the series resistance r. An absolute disappearance of the differential field, however, can generally not be obtained, since the wave form in the one branch is somewhat distorted, owing to the presence of the ferro-magnetic substance; but in most practical cases the minimum of the differential field can be very readily and accurately detected. For

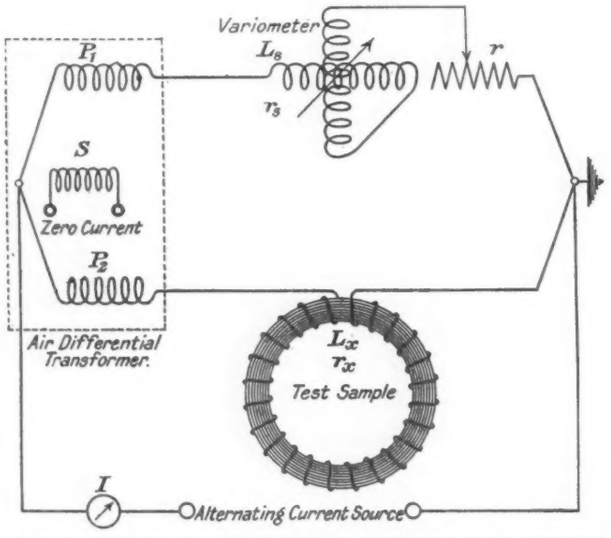


FIG. 1—METHOD OF DETERMINING MAGNETIC FLUX DENSITY

very precise measurements it is advantageous to insert a condenser in series with the indicator in the secondary circuit of the differential transformer and tune this circuit to resonance with the required frequency. (This is especially recommended at higher frequencies, since tuning is then readily obtainable.) For frequencies up to about 2000 cycles a Wien vibration galvanometer may be used as a current indicator and the condenser dispensed with.—*Proceedings of Institute of Radio Engineers.*

Magnetization of Iron, Nickel and Cobalt by Rotation.—S. J. Barnett.—Observations were made with nickel and cobalt rotated at different speeds and in each test H/n was found to be independent of the speed within the limits of experimental error, a result previously obtained by the writer in experiments with iron. Every set of observations gave the sign of H/n negative like that of $4\pi m/e$ for an electron. The mean magnitude of H/n is in all cases somewhat less than the accepted magnitude of $4\pi m/e$, viz., 7.1×10^{-7} electromagnetic units, obtained from other experiments on electrons in slow motion, ranging from 5.1 to 6.5×10^{-7} electromagnetic units for the most reliable observations, those at the highest speeds. The differences are in the same direction as in the earlier experiments on iron, which gave 3.6 and 3.1 in place of 7.1; but the experimental errors, on account of the great difficulties involved, are such that importance cannot be attached to the discrepancies. The investigation must rather be taken as confirming the equation $H/n = 4\pi m/e$ both qualitatively and quantitatively, on the assumption that only electrons are in orbital revolution in the molecules of all the substances investigated. It shows, moreover, that the effect is independent of the size of the body in rotation.—*Phys. Review*, July, 1917.

Units, Measurements and Instruments

An Electric Dynamometer.—E. M. Olin and C. A. M. Weber.—Limitations of the prony brake are outlined. A typical electric dynamometer is described and the method of using it to conduct different tests is explained. An interesting electric dynamometer for testing high-speed apparatus is also described.—*Elec. Journal*, September, 1917.

An Experimental Study of the Fahy Permeameter.—This permeameter was developed during the course of an investigation at the Bureau of Standards on the magnetic-mechanical properties of steel. In order to ascertain the degree of accuracy attained, as well as its fitness for general laboratory use, a critical experimental study of the instrument in its present form has been made. The instrument represents a distinct advance in the measurement of the magnetic characteristics of steel and other magnetic materials. In accuracy it far excels the direct-reading permeameters which have been rather commonly used both in this country and abroad. Normal induction measurements of solid bars show errors no greater than 5 per cent of the magnetizing force required for a given induction. The consistency of its readings taken at different times on the same specimen is so close that comparative results on similar materials can be obtained to a much higher degree of precision. Commercial materials, however, are seldom uniform enough to warrant better precision than 5 per cent. Hysteresis measurements are accurate within the limits of commercial requirements and the uniformity of commercial materials.—*Scientific Paper* No. 306, Bureau of Standards.

Fault Localization by Drop of Potential.—H. E. Blake.—In utilizing the drop-of-potential method the ideal conditions for success are indicated by the accompanying diagram. The distance to the fault, x, is obtained by the formula $x = l \times d_1 c_2/(d_1 c_2 + d_2 c_1)$, in which x = distance of fault from a, d_1 = galvanometer deflection with s to a, d_2 = galvanometer deflection with s to d, c_1 = milliamperes with s to a, c_2 = milliamperes with s to d, l = length ab. Without altering galvanometer shunt, or variable resistance, and with two sound

lines available between the ends of the faulty cable, it is unnecessary to know their length or sectional area, because, with the two-way change-over switch *s* to *d*, the drop is measured by *g* between *f* and *b* only, *af* and *cb* automatically becoming extensions of the galvanometer leads. Similarly with *s* to *a*, the drop is then measured from *a* to *f* only, *cb* becoming an extension of the galvanometer lead to *c*. The result eliminates all errors except those of contact resistance, which can be guarded against by clean connections, and those due to the slight difference in length between the inner and outer conductors of a concentric system, owing to the bridging

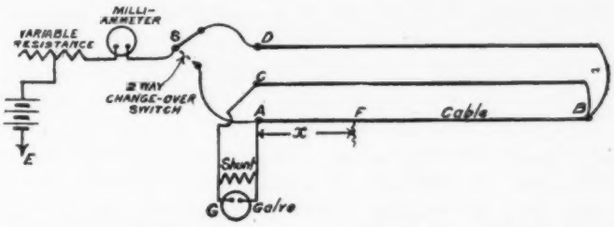


FIG. 2—CONNECTIONS OF APPARATUS USED TO LOCATE FAULTS

of the outers, where the cable has been cut for services. The errors entirely eliminated by this method of connection are those due to the fault-resistance loop at the far end and that due to the cable connections to the apparatus. When locating faults on alternating-current concentric low-tension systems it must be remembered that this system acts as a condenser giving high readings in volts from inner conductor to earth with ground insulation.—London *Elec. Review*, Aug. 24, 1917.

Miscellaneous

Insulating Lacquers.—MAX BOTTLER.—Generally speaking, an insulating lacquer should have the following properties: a sufficient insulation resistance, non-inflammability, a capacity to repel or resist water, a reasonably long life, a power to resist oxidization and the effects of rust, a considerable degree of hardness, and a power to resist chemical action of different kinds. An insulation resistance of 1000 volts over a thickness of 0.025 mm. is generally sufficient. It must also resist changes of temperature, and it must adhere firmly, while possessing sufficient elasticity. If a lacquer is intended for use on overhead wires, it must dry quickly without being heated; this, of course, depends on the solvent used. If a drying oil, like linseed oil, is used with a suitable drying agent, it generally dries at ordinary temperatures in eight or ten hours, and a fatty lacquer, if slowly dried, is found to have greater power of resisting chemical or mechanical action than if it is more quickly dried. While the insulating lacquers on the market which contain copals and linseed oil are seemingly satisfactory, their permanence may be questionable. Probably the best lacquers are prepared by a new so-called "dry" process by the reaction between "formin" and carbolic acid, "formin" itself being prepared from the reaction between formalin and ammonia. These lacquers have excellent insulating properties.—Abstracted from *Elekt. Zeits.*, No. 11, 1917, in London *Electrician*, Aug. 24, 1917.

Electrical Conductivity of Metal Films.—ROBERT W. KING.—Reasons are given for rejecting Thomson's and Swann's theories of the abnormally small specific conductivity of metal films. A relation connecting conductivity and thickness is deduced from the supposition of a more or less random arrangement of groups of atoms. This relation seems to fit observations upon films of platinum, gold and silver in a very satisfactory manner. It has been found that the thinnest films of gold and silver show a granular structure when examined with a "dark field" microscope, and that thicker films of these metals appear quite uniform. No structure has been observed in platinum films, but this is probably due to the limitations of the microscope. It has been found that, in order to just conduct, platinum films must be between 1.5 μμ and 3 μμ thick, gold and silver films between 6 μμ and 8 μμ thick. As it seems doubtful if particles of the sizes necessitated by these thicknesses can be detached from the cathode by the bombardment, their formation is probably due to the condensation of atoms of the metals. This supposition is further supported by the similarity between the writer's results and those of Weber and Oosterhuis obtained on films produced by condensation. It is pointed out that the recorded variations of *n* and *k* with thickness appear to present no obstacles to the acceptance of the present theory.—*Phys. Review*, September, 1917.

Errors in Thermometry.—LE CHATELIER.—An article on the measurement of high temperatures containing a brief description of the various methods at present in use and devoting some space to a consideration of the thermo-electric (Le Chatelier) type of instrument. Attention is called to the necessity of frequent regraduation of thermocouples, which alter in use. Further, the sensitivity of the galvanometers used varies with time, either from loss of magnetism in the permanent magnets or from changes in the verticality of the instrument. The moving coils, which are generally heavy, rarely have their center of gravity exactly in line with the points of suspension. The result is a disturbing couple, which tends to modify the galvanometer readings. Very often errors are discovered the exact cause of which it is difficult to trace. The most frequent trouble is that the wires of the couple come adrift when they are simply twisted together instead of soldered, or they break when heated in a reducing atmosphere. If contact ceases entirely, the trouble is easily discovered, but very often the wires continue to touch and allow the current to pass, but with a reduction in strength on account of the additional contact resistance, and the readings are therefore falsified without the observer being aware of the exact trouble. A cause of error frequent in factories arises through fine iron powder settling on the soft iron core and damping the action of the moving coil slightly. This source of error is even more difficult of discovery than those mentioned above. Finally, in laboratory tests, when the couple wires are not immersed sufficiently in the substance to be tested, the thermal conductance of the wires cools the thermo-junction and materially affects the readings.—Abstracted from *La Nature* in London *Elec. Review*, Aug. 17, 1917.

Bibliography of Literature on Submarine Mines and Torpedoes.—DAVID B. RUSHMORE.—Refers to lists of books and articles on the subject from 1873 to the present time. The patents on submarines date back to 1850, on life and vessel-saving devices to 1884, and on torpedoes to the year 1862.—*Gen. Elec. Review*, August, 1917.

NEWS OF THE INDUSTRY

Chronicle of Important Events and General Activities in the Technical, Commercial and Manufacturing Fields

ORGANIZING FOR THE NEW LIBERTY LOAN CAMPAIGN

Trades Committees in Process of Organization in New York City—George B. Cortelyou Named Chairman for Public Utilities

In organizing the campaign for the second Liberty Loan, the distribution committee of the Liberty Loan committee in New York City has formed a trades committee. Up to Sept. 24 thirty-three men, each prominent in his industry or trade, had accepted chairmanships of trade committees. An advisory trades committee has also been formed by the main committee to keep in touch with the various individual trades committees. It is hoped that the total of the trades committees will reach 100.

George B. Cortelyou, president Consolidated Gas Company, New York, will be chairman of the public utilities committee. It is suggested by the main committee that the chairman of each committee appoint an active vice-chairman, a secretary who will be able to give the majority of his time to the work on the committee throughout the campaign, and a publicity man, selected from the committee, who will be able to devote practically all of his time to the work. A director of speakers should also be appointed by the chairman. Speakers for meetings throughout the trade will be supplied by the speakers' bureau of the Liberty Loan committee.

An experienced bond salesman will be assigned to each trade committee, who will supply the trade committee with standard selling talks, which the experiences of the last loan proved necessary, in order that all canvassers may work along the same lines. The bond salesmen will confer and co-operate with the canvassers selected by the trade committee.

It is suggested that each trade committee select a field force of canvassers composed of active salesmen in that trade; the more canvassers, the better showing that trade should make.

It is hoped that the members of the committee will endeavor personally to obtain subscriptions where they deem it advisable, while it is essential that every employer be visited. Canvassers should solicit subscriptions from firms and individual members and executives thereof. They should point out to each firm the business necessity of holding meetings of its employees and inducing these employees to subscribe as individuals on the partial-payment plan, either through the employer or through a bank, and as each firm agrees to undertake this activity, standard material for handling partial payments will be supplied.

The Consolidated Gas Company will send "buy a bond" circulars with its bills for September, and other gas and electric companies are expected to follow the same plan.

FURTHER DELAY IN THE WAR REVENUE TAX BILL

Differences Between House and Senate Conferees Block Action on Measure, Although Objectors May Be Forced to Give Up

The war revenue tax bill, which has been in conference between the House and the Senate, seems to be in a fair way to fail at the present writing. There has been a deadlock on certain questions during the last week or ten days. When this was written by the Washington correspondent of the ELECTRICAL WORLD it seemed possible, even probable, that the House conferees would report their disagreement with the Senate conferees to the House ways and means committee with the intention and expectation that the whole bill would be virtually rewritten in the House of Representatives.

There is even talk in Washington now that an effort will be made to postpone the passage of the war revenue tax bill until December. A bitter fight is in prospect over the bill. Some of the House conferees believe that the percentage of exemption of capitalization should range between 7 and 9 per cent. Other House conferees are insistent upon a flat 8 per cent capitalization exemption instead of the 6 per cent minimum and 10 per cent maximum provision in the bill as it came from the Senate.

When Speaker Clark stated to the Washington correspondent of the ELECTRICAL WORLD that no human being could tell what the House of Representatives might do with the war revenue tax bill, as previously reported in these columns, he had apparently in mind such a situation as now confronts Congress and the country. If the House conferees on the revenue tax bill fulfill their threats to take the conference reports before the House ways and means committee, there is scarcely any doubt, in the opinion of Washington observers, that the whole question of excess profits will be taken on to the floor of the House of Representatives and perhaps from there once more back to the Senate.

There is a feeling on the part of many members of the House that the Senate has exceeded its authority in framing this bill in the manner in which it has come to the House. Some members of the House are smarting under the allegation that the House committee frames appropriation bills but that the Senate really whips them into shape and always expects the House to consent to the details which the members of the Senate favor.

Many members of the House are laboring for an opportunity to either put something into the war revenue tax bill or take something out. They believe that senators have exercised such a privilege. In these circumstances it would not be surprising to the best in-

formed opinion in Washington if there should be a considerable delay on the passage of this bill unless Congressional leaders made a strong effort to push through the conference report.

CO-OPERATION ADJUSTS PASADENA COMPETITION

General Manager Brackenridge of Southern California Edison Company Commends Arrangement Which Eliminates Duplicate Distributing Systems

By co-operation between the Southern California Edison Company and the city of Pasadena an adjustment of the competitive situation which has existed for ten years has been made. The city is to purchase the distributing system of the company.

Announcement of the arrangement, made by C. W. Koiner, engineer of the Pasadena municipal lighting plant, includes the following details:

Value of Edison distributing system in Pasadena, $500,714.79, payable in cash at the end of two years' lease.

The city to agree to purchase power for a period of thirty years, the rates for same to be fixed now for the first ten years and revised every five years thereafter, or, in case of disagreement, to be fixed by the Railroad Commission.

The Pasadena steam plant to be shut down and operated only as needed, or at the order of the Edison company.

Pasadena to agree to confine itself to the distribution of electrical energy to the city and to agree to sell to the Edison company its distributing system outside the city, with some exceptions.

Extensions to both systems during two-year-lease period to be made under contract.

As rental for the company's system Pasadena would pay to the Edison company an amount equal to 8 per cent per annum on the agreed purchase price and 3.36 per cent per annum, to be held by the city as depreciation reserve.

The Edison company is to assume the unexpired term of lease on its office in Pasadena.

Mr. Koiner also showed that the settlement will lead to the removal of more than 6000 duplicate poles from the streets and will eliminate the waste due to competition.

W. A. Brackenridge, vice-president and general manager Southern California Edison Company, made the following statement:

I have examined the report made by Manager Koiner to the Pasadena Commissioners covering the matter of the settlement of the power difficulties in Pasadena and believe that he has made a clear and concise statement of the entire situation.

If ever there was a time in the history of the nation when co-operation in every line is imperative that time is now, and it would be almost criminal for the Edison company to hold out against a settlement which would eliminate the waste of duplication in distributing systems, particularly when copper is in such demand for war purposes.

We find the great railways of the country being managed co-operatively for the benefit of the government and all lines of food production and distribution as well as every manufacturing interest in the nation trying to do their bit. This settlement is along the same lines.

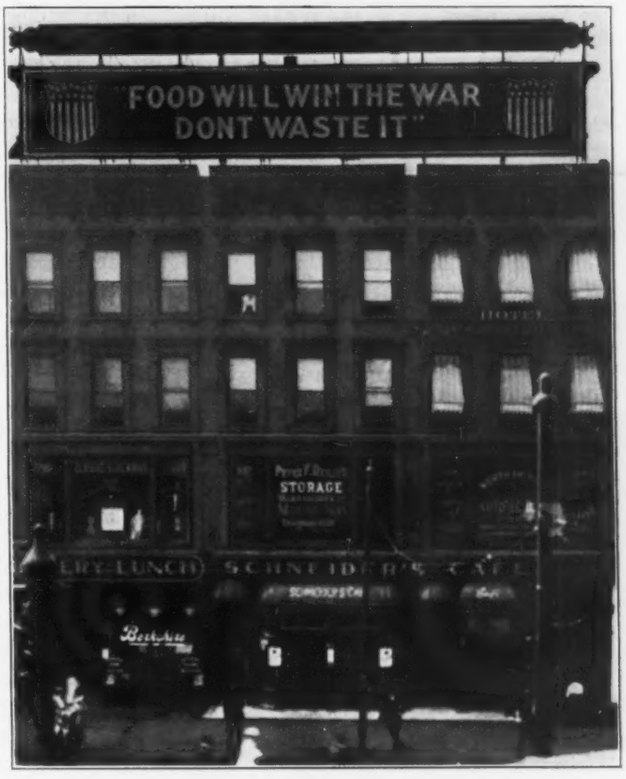
I believe that the use of water power in place of oil for the manufacture of electricity for Pasadena will be at least a small aid—at least a drop in the bucket. The elimination of thousands of poles in the streets will benefit the whole city. We can eliminate the duplication in operating expense and in pay rolls and, from our own selfish standpoint, we are glad that this will settle the ten years' controversy.

The day of co-operation is here. We face a new era in public utility management, and that company which does not co-operate fully and frankly with the public is doomed to failure. It is for this reason that the same settlement—and on practically the same terms—was made in Los Angeles as is now worked out for Pasadena.

CONSERVATION OF FOOD IS HELPED BY ELECTRIC SIGN

Brooklyn Edison Company Gives Use of Large Illuminated Billboard Sign to Help in Winning the War by Saving Food

Co-operating with the very excellent work of the Food Administrator, Herbert C. Hoover, the Edison Electric Illuminating Company of Brooklyn, N. Y., has given over its large illuminated billboard sign at Times



HELPING TO CONSERVE FOOD

Plaza, opposite the Long Island Railroad terminus, subway, elevated and surface railway stations.

The sign has been painted with the slogan: "Food Will Win the War—Don't Waste It." The letters are over 4 ft. (1.2 m.) high, and the American shields approximately 6 ft. by 10 ft. (1.8 m. by 3 m.). The border is in red, white and blue.

This is considered one of the busiest spots in Brooklyn, and it is estimated that over 300,000 people pass daily. The fact that this sign is in constant use by the Brooklyn Edison Company, advertising the sale of electric light, power and appliances, makes it an especially valuable addition to the work being done for food conservation.

ELECTRIC STEEL PRODUCTION REQUIRES 750,000,000 KW.-HR.

Electric Furnace Practice Discussed in a Number of Papers at Foundrymen's Convention, Held at Boston This Week

An entire session was devoted to recent aspects of electric furnace practice at the Boston convention of the American Foundrymen's Association this week. In a paper on "Recent Developments in the Application of the Electric Furnace to the Melting Problem," Douglas Walker, Booth-Hall Company, Chicago, pointed out that within the past year the electric furnace has become accepted as a standard type of melting equipment. A steel founder to-day buys on the strength of the known value of given combinations of features. Electric furnaces are to-day in operation in foundries for melting steel scrap, refining steel scrap, refining molten steel and melting gray iron, malleable iron, ferro-manganese, ferro-alloys, copper and copper alloys.

USES OF THE ELECTRIC FURNACE

The common use of the electric furnace in the foundry is for melting down steel scrap for steel-casting production, the latter being of superior quality. In some foundries the electric furnace is used for the melting and refining of steel, where an extra high quality of steel is desired, low in sulphur and phosphorus and meeting definite specifications. The Canadian and United States governments are both installing a considerable number of electric furnaces for this purpose, the chief object being the production of steel low in sulphur. Eventually the application of the electric furnace to the melting of malleable iron will be as important as it is to the steel industry to-day. At present reliable information on this branch of practice is very scarce. Ordinarily, the electric furnace cannot compete commercially with the cupola for melting gray iron. It is useful, however, in manufacturing aeroplane motor cylinders of very high-grade gray iron, owing to the facts that the sulphur content is kept down, that the metal is melted under conditions ideal for the production of iron free from air-holes, and that the iron produced from an electric furnace has the same density that is characteristic of electric steel. The use of the electric furnace for melting ferro-manganese is gaining ground, especially in large steel plants operating a number of open-hearth furnaces. In a representative case the loss of manganese was less than 10 per cent. The writer advocated the use of the basic process in operating electric furnaces for the production of steel castings under present market conditions, irrespective of the comparatively high cost of basic refractories. The author pointed out the increasing unwillingness of central stations to accept single-phase furnace loads and closed with brief comments upon the superiority of electric steel through greater uniformity, increased accuracy of meeting specifications and generally improved quality.

Results of operation in the plants of the Sivyer Steel Casting Company, Milwaukee, Wis., and the Electric Steel Company, Chicago, were given in a paper by C. R. Messinger of the former company on "Comparison of the Electric Furnace and Steel Converter for Manufacture of Small Steel Castings." The author discussed the operation of two bottom-electrode, single-phase electric furnaces. The best results were obtained with acid linings. An average of 368 heats per lining has been obtained, with a refractory cost of 7.8 cents per ton of steel. The electrode cost was 70 cents per ton and the power consumption average 635 kw.-hr. per ton. The total costs show a slight margin in favor of the electric furnace, but the writer stated that in the East, where the freight on low-phosphorus pig iron is much lower, the margin would be in favor of the converter. In the best thirty-day period an average of 9.24 heats per twenty-four hours was obtained, the average melting time being two hours and twenty-five minutes and the average charging time ten minutes. The furnaces were of 1-ton capacity. The average labor cost was $2.10 per ton of steel melted, including bringing scrap in from the yard and repairs. The consumption of electrodes on a furnace making 2029 heats in thirteen months was 13,170 lb., or 5.15 lb. per ton of steel melted. The present cost of graphite electrodes is about 13 cents per pound. The foregoing furnace was used in pouring very small castings with an average weight of less than 4 lb.; hence the furnace was not tapped until the metal was very hot and the power was left on longer than would be required in most foundries. A power consumption of 570 kw.-hr. per ton could easily be attained by greater care in operation. Repairs need not be made oftener than once in six weeks. Numerous classes of scrap can be utilized. Continuous service by the central station is most important. A plant with a power rate of 0.75 cent per kw.-hr. will save $8 per ton in the cost of finished castings over a plant with a 1.5-cent rate, other things being equal.

THE CENTRAL STATION POINT OF VIEW

"The Electric Furnace from the Central Station Viewpoint" was the title of a paper by Edwin L. Crosby, Detroit Edison Company. So far about 200 electric furnaces, having an annual capacity of 1,200,000 tons of steel, have been installed or contracted for in North America. This steel production requires about 750,000,000 kw.-hr. Errors in installation and application should be avoided through a closer study of electric furnace equipment and service than has been made in the past. The power salesman should have a fairly good understanding of the metallurgical practice involved before attempting to give advice or data. With the possible exception of one type of arc furnace and the certain exception of the induction furnace, all steel furnaces on the market to-day, if properly installed, will operate with a power factor of 80 to 85 per cent during the early stage of the melting period, later rising to 85 or 90 per cent, and finally to 95 per cent or better during the refining period. Regulation, phase balance and wave distortion have not received sufficient attention. Present electrode regulation is at best very unsatisfactory, it being impossible with any existing equipment to obtain sensitive regulation without hunting of electrodes and disturbance of phase balance. Wave distortion common to arc furnaces may lower the efficiency of rotary converters and affect the accuracy of watt-hour meters. Any central station man who urges the installation of electric furnaces for steel based upon the present market may later have cause for regret, unless he receives a rate commensurate with the risk.

The fourth paper, "Notes on an Electric Furnace Design," by John A. Crowley, Detroit, Mich., described the design and construction of a 1-ton electric furnace built by the author. In choosing between a rugged, simple design and one more finished and complex, the author recommended the former, which will require little or no attention. Replacements can also be made more rapidly in case of breakdown. A 1-ton furnace of any design will range in price from $15,000 to $25,000. Most successful polyphase furnaces are equipped with automatic electrode control. In the case described, totally inclosed motors were employed to effect the electrode movements.

Below are given conversion cost data on a 1-ton furnace. The power and electrode consumption figures were obtained from furnaces of similar size operating in Europe. The price of scrap is based on Pittsburgh prices current about Sept. 1 and the labor costs are based on conditions existing in Detroit about Sept. 1. These figures may be readily changed to meet any special local condition. An average rate for power the country over is $0.01 per kilowatt-hour. The figures are as follows:

Scrap (turnings)	$24.00
Power, at $0.01 per kilowatt-hour	7.00
Electrodes, at $0.075 per lb.	1.35
Slag material, lime, spar and coke	.30
Alloys (approximate):	
4 lb. 50 per cent ferro-silicon	.48
3 lb. 80 per cent ferro-manganese	.59
1 lb. aluminum	.65
Refractories (basic)	.45
Skilled labor melter, $6; boy, $3.50	2.38
Unskilled labor, two men forty minutes each heat to handle scrap and charge furnace, at $0.32 per hour	.32
Cost of metal at the spout	$37.52

The foregoing costs are based on twenty-four-hour operation with a minimum production of 8 tons per day.

ACTION OF BUSINESS MEN ON WAR AND NATIONAL PROBLEMS

Members of Chamber of Commerce of the United States Declare for Water-Power Development Legislation

Definite resolutions expressing convictions and recommendations of the Chamber of Commerce of the United States on many questions affecting industry, the war and the government were passed at the convention at Atlantic City last week.

Among these were declarations on the subject of water-power development, price revision, the Federal Trade Commission, daylight saving, co-operation for export trade and government purchases, price control and priority of shipments.

On water-power legislation the Chamber of Commerce passed the resolution published herewith. Another resolution set forth the great need of development of public land water-power sites.

The organization has placed itself on record in favor of government fixing of prices on essential products. As the cost of the various elements entering into production cost—raw materials, labor, transportation, etc.—may vary from time to time, the Chamber urges that such board or boards as have the responsibility of fixing prices "shall afford opportunity to industries affected to present changes in cost of production to the end that such fixed prices may be revised when necessary in order that the proper relation between such cost of production and such fixed prices may be maintained."

As trade organizations are to-day in grave doubt as to the subjects they are permitted under present laws to discuss and as to the agreements between members into which they may enter and members of such associations are earnestly desirous to violate no laws, the convention expressed its feeling that business interests would be best served if the Federal Trade Commission or some similar government commission should be empowered to tell officers of trade organizations and business men what they are or are not permitted to do jointly with competitors in a lawful manner.

Action by Congress and the President was urged to make the daylight plan effective as a war measure.

Earlier expressions concerning the great importance of legislation to permit co-operation for export trade were reiterated. It was also resolved that although the occupation of the Senate committee on interstate commerce with proposals for other legislation of importance is thoroughly realized, the Senate committee on interstate commerce be asked to report for consideration the present bill, known as the Webb-Pomerene bill, to promote export trade.

In substance, the Chamber of Commerce holds that all government war buying should be assembled under control of one board or executive department, which should have full power to procure war supplies to the best advantage to the government as to price, quality and delivery and in a way to maintain essential industrial life without disturbing social and economic conditions, including the power to fix prices not only to the government but to the public on essential products and to distribute output in a manner to promote the national defense and the maintenance of our industrial structure.

DEVELOP WATER POWERS

Whereas the scarcity of coal and other fuels during the past year, with the resulting disastrous effect on every branch of commerce and industry, calls renewed attention to the great importance of developing at the earliest possible day unused water power in order to make available for public service an inexhaustible power not requiring the consumption of exhaustible power, and

Whereas increased use of water power, because it furnishes a cheap and reliable power of general application, reduces the drain on our stores of mineral fuel which when consumed can never be renewed, and thereby relieves a great stringency bearing on national defense due to the imperative need for fuel for both land and water transport and the manufacture of war supplies; be it therefore,

Resolved, That Congress should without delay enact legislation necessary to the early development of water power at sites now under federal control on terms which will advance and protect the public interest; also

Resolved, That the directors appoint a special committee to investigate this present need of water-power development and the character and extent of legislation required and report to this chamber as promptly as possible.

(Resolution passed by the Chamber of Commerce of the United States at Atlantic City convention last week.)

ELECTRICAL SERVICE FOR LONG ISLAND CANTONMENT

Construction Work Necessary for Supply of Energy at Camp Upton Is Finished on Schedule Time

Electrical service for the cantonment at Camp Upton, Long Island, is being furnished by the Long Island Lighting Company both for lighting and power purposes. Some details regarding the construction work necessary for the electrical supply have been given to the ELECTRICAL WORLD by H. M. Case, managing engineer of E. L. Phillips & Company, who are in charge of the construction and engineering work for the Long Island Lighting Company.

Camp Upton, situated on a government reservation comprising 16,000 acres, is on the main line of the Long Island Railroad between the villages of Yaphank and Manorville. When entirely completed the camp will have from 15 miles to 20 miles (24 km. to 32 km.) of well-paved streets, a modern sewage system, a modern waterworks system and an electric light and power distribution system.

The streets will be lighted by approximately 350 100-cp., 6.6-amp. gas-filled tungsten lamps. There are five pumping stations, two for the waterworks system, aggregating 600 hp. in capacity, and three for the sewage system, aggregating 135 hp. The refrigerating plant is also operated by electric motors in capacity approximating 135 hp. Several hundred horsepower capacity of motors is also required for the laundry, hospital, many other minor power purposes and for heating. The larger motors, 75-hp. and 50-hp., are designed for 2200 volts, three-phase, thus taking energy directly from the distributing main without transformers. The smaller motors are 220-volt and 440-volt, three-phase, except the very smallest, which are operated single-phase.

It is estimated that the capacity required for indoor lighting will be approximately 725 kw., for street lighting 50 kw., and as so far planned the complete installation will aggregate approximately a connected load of 1900 kw.

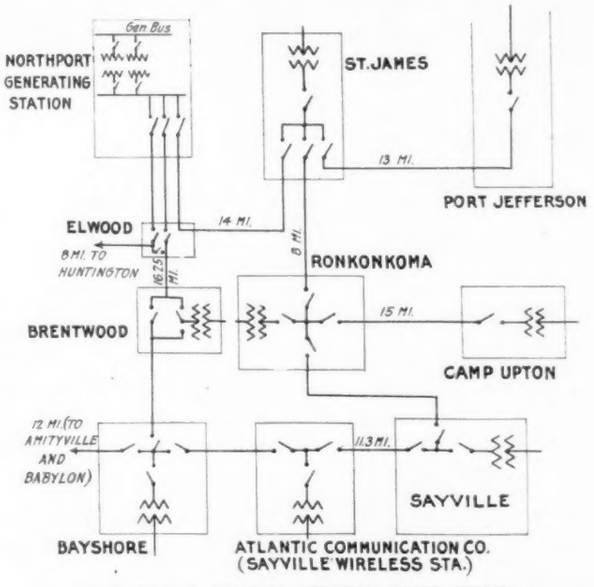
The street-lighting system is supplied through constant-current pole-type transformers in various sections or districts, each transformer being furnished with a pole-type oil switch operated by a rope from below. These transformers are placed on poles at brigade headquarters so that on necessity the guard on duty can promptly either darken or lighten the camp as may be required.

The distribution about the camp is 2300-volt, three-phase, on the main service avenues, with 2300-volt, single-phase laterals through the streets. The secondary distribution is largely 110/220-volt, three-wire system, only the terminal and lightly loaded ends being 110-volt, two-wire system. A separate three-phase power circuit is run from the main transformer station to the refrigerating plant and sewage pumping plants. This power circuit, as well as the primary laterals and the secondary distribution, is put in by the general contractor, the Thompson-Starrett Company.

All of the electrical work inside of the camp is constructed in accordance with specifications supplied by Frank Sutton, consulting engineer retained by the Quartermaster's Department of the government to plan and supervise this portion of the camp construction.

To reach the camp it was necessary for the Long Island Lighting Company to construct approximately 12 miles (19.3 km.) of 23,000-volt, three-phase, 60-cycle No. 4 hard-drawn copper-wire line from a point on its transmission system at Ronkonkoma to Camp Upton and to build 4 miles (6.4 km.) of 2300-volt distributing main from the substation, or a total of about 16 miles (25.7 km.) of line. Several miles of the transmission line had to be constructed through dense forests which had to be cleared out, and a part of it through swampy land which made setting of poles difficult. The transmission line is complete with 5/16-in. (8-mm.) Siemens-Martin steel-top strand, grounded at every tenth pole for lightning protection, as lightning is unusually severe in the Long Island district.

The main substation is near the southeast end of the camp and has a capacity of 1000 kw. in three 333-kva. transformer units. The transmission lines and transformer station are operated at present on a 13,200-volt delta-connected system. The system will shortly be



ELECTRICAL SYSTEM SERVING CAMP UPTON

changed to one of 23,000 volts, and all transmission lines, substation equipment and arrangements are laid out for use at the higher voltage, which will be operated with star-connected transformers having grounded neutral.

From the substation at Ronkonkoma the line was built to the east to reach Camp Upton, and by means of the loop system the camp can be served from either the south or the north by suitable switching arrangements at Ronkonkoma. The main generating plant of the lighting company is at Northport.

Most of the energy for the camp is supplied from the substation mentioned, but owing to the fact that the pumping plant at the wells is nearly 4 miles (6.4 km.) west of the camp, a second substation is supplied at a point on the transmission line opposite this pumping plant having a capacity of 300 kva. in three 100-kva. units, making a total substation capacity for the camp of 1300 kva.

It was a problem in the short space of time after the contract was made with the lighting company to secure material and labor and construct the 16 miles (25.7 km.) of line and substation by the time service was

required. Fortunately the constructing company had on hand copper, insulators and hardware; but it had great difficulty in getting poles. However, by having two men locate poles in different sections of the country and follow them closely by railroad, they were brought to the job in time.

By diverting to the job about sixty of the constructing company's linemen from various construction gangs, and by the kindly loan by the New York Edison Company of twenty-eight of its linemen for four days at the conclusion of the work, the work was completed in time and the current turned into the camp on Sept. 5. The actual time spent on the construction was twenty-seven days. The field construction was under the supervision of the chief of construction of E. L. Phillips & Company, A. McLaren.

The co-operative spirit shown by the New York Edison Company in voluntarily offering some of its men to help on this work was highly commended and much appreciated by the lighting company.

SHORTAGE OF POWER IN KANSAS CITY, MO.

With the Co-operation of Manufacturers Requirements Are Kept Within Generating Limits During Morning and Evening Peak

A. E. Bettis, superintendent of engineering and construction for the Kansas City (Mo.) Light & Power Company, writes to the ELECTRICAL WORLD in reply to an inquiry regarding the shortage of power in that city:

We are handling the shortage of power in the following manner:

A schedule is made up showing total power available for every hour during the day, also a curve is made showing load at each corresponding hour. With the co-operation of the manufacturers we are able to keep the power down to within our generating limits during our morning and evening peak. This is done by the manufacturers agreeing to reduce their load on our morning and evening peak and operate at other hours during the night and day, thereby making up their lost operation.

This condition however in our city is improving very materially, and we hope in the near future that all of our customers will be operating normally.

At present we are installing considerable additional equipment to take care of this condition.

ASK FOR HIGHER RATES FOR THE MILWAUKEE COMPANIES

Petition Filed as an Emergency Measure Under the Public Utilities Commission Act—Few Consumers Affected

Testifying before the Wisconsin Railroad Commission at Madison on Sept. 19, S. B. Way, vice-president and general manager Milwaukee Electric Railway & Light Company and Milwaukee Light, Heat & Traction Company, showed that more revenue is necessary to overcome higher operating costs.

Mr. Way said that the companies are paying from $2 to $2.65 per ton for coal at the mines. It was testified that the proposed increase in rates, as reported in last week's issue of the ELECTRICAL WORLD, would affect 550 of the 50,000 patrons. The cost of coal to the companies during the next winter season would be $17,000 a month more than it was during the last winter period.

FLOODLIGHTING HUGE SIGN ON CALIFORNIA HILLSIDE

Nine 1000-Watt Projectors Are Used to Illuminate Gigantic Figures So that They Are Read as Easily by Night as by Day

An unusual example of floodlighting is the illumination of the huge Heinz "57" sign established on the hills south of Los Angeles, service for which is supplied by the Southern California Edison Company. This sign consists of the figures "57" in Arabic numerals, made of concrete painted white and occupying an

NIGHT VIEW OF ADVERTISING SIGN NEAR LOS ANGELES

inclined position of about twenty degrees on a sloping hillside which is green all the year round. The size of the figure "5" is 70 ft. by 130 ft. (21.3 m. by 39.6 m.), while that of the figure "7" is 85 ft. by 130 ft. (25.9 m. by 39.6 m.). The two figures together occupy a space of 130 ft. by 208 ft. (39.6 m. by 63.3 m.), or 27,040 sq. ft. (about 2500 sq. m.).

With the idea of still further increasing the advertising value of the sign, large floodlight projectors have been installed to make it effective by night as well as by day. The floodlighting installation consists of nine 1000-watt Western Electric Davis projectors arranged in a horizontal line and mounted close together on a platform which is supported by two poles. Energy is turned on by means of a time switch with the street lights half an hour after sunset and turned off three hours later.

Information from the Weather Bureau shows that foggy conditions interfere very little with the view of the sign as most of the fogs are between midnight

DAYTIME ASPECT OF THE SIGN

and dawn. Only ten nights in the year have there been fogs that would interfere with a view of the sign while illuminated.

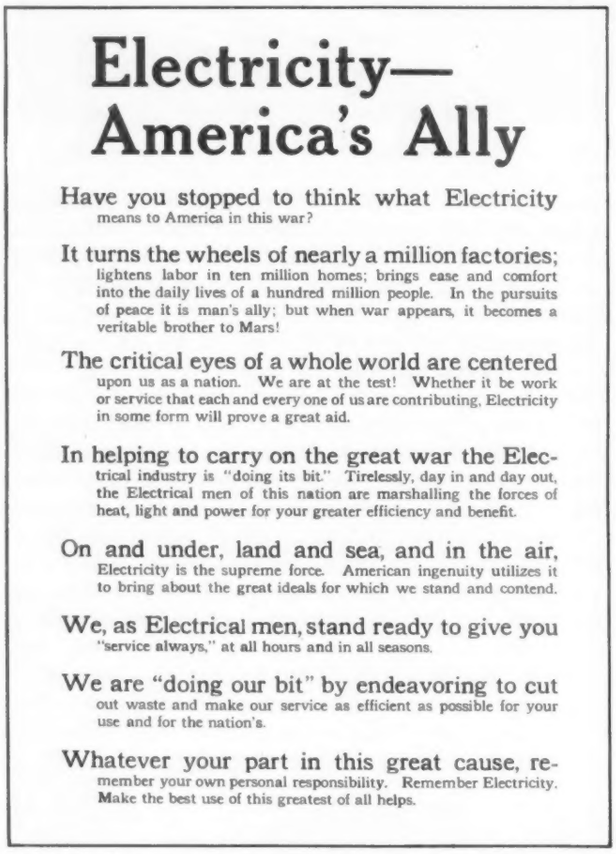
It is estimated that during the day and that portion of the night when the sign is floodlighted an average of fully 2,000,000 people each month pass within view of it.

FALL SALES CAMPAIGN FOR CHRISTMAS GIFTS

Society for Electrical Development Will Conduct Movement to Promote Electrical Presents—No Special "Week" This Year

To promote concerted action in selling Christmas electrical gifts the Society for Electrical Development will conduct a nation-wide campaign this fall. It will take the place of "America's Electrical Week," which will not be held owing to war conditions.

The society will announce its campaign to the industry on Oct. 10. Every central station and practically all contractor-dealers will be reached, fully 25,000 business organizations. An effort will be made to have the industry co-operate solidly in merchandising wares to the Christmas trade.


Electricity—
America's Ally
Have you stopped to think what Electricity means to America in this war?
It turns the wheels of nearly a million factories; lightens labor in ten million homes; brings ease and comfort into the daily lives of a hundred million people. In the pursuits of peace it is man's ally; but when war appears, it becomes a veritable brother to Mars!
The critical eyes of a whole world are centered upon us as a nation. We are at the test! Whether it be work or service that each and every one of us are contributing, Electricity in some form will prove a great aid.
In helping to carry on the great war the Electrical industry is "doing its bit." Tirelessly, day in and day out, the Electrical men of this nation are marshalling the forces of heat, light and power for your greater efficiency and benefit.
On and under, land and sea, and in the air, Electricity is the supreme force. American ingenuity utilizes it to bring about the great ideals for which we stand and contend.
We, as Electrical men, stand ready to give you "service always," at all hours and in all seasons.
We are "doing our bit" by endeavoring to cut out waste and make our service as efficient as possible for your use and for the nation's.
Whatever your part in this great cause, remember your own personal responsibility. Remember Electricity. Make the best use of this greatest of all helps.

SOCIETY FOR ELECTRICAL DEVELOPMENT POSTER ON ELECTRICITY IN THE WAR

Following the general announcement an illustrated "how to" booklet will be mailed about Nov. 1, giving concrete suggestions for selling appliances and how the reader can tie into the national drive. Members and non-members of the society will be offered attractively designed window lithographs, window cards, window transparencies, poster stamps, etc., without cost. The official design is being prepared. It will embody into the Christmas spirit the slogan "Give something electrical this Christmas." The society will also send a portfolio of advertising suggestions for newspaper advertisements, mailing cards, folders, etc.

The campaign is not intended to be as large as either "Electrical Prosperity Week," 1915, or "America's Electrical Week," 1916. It will, however, be a real selling campaign.

ARMY AUTHORITIES SEIZE THE CHILLICOTHE PLANT

Officials of Camp Sherman Protect Service Against Interference by Authorities of Ohio City

Army authorities in charge of Camp Sherman, near Chillicothe, Ohio, seized the plant of the Chillicothe Electric Railroad Light & Power Company on the evening of Sept. 25, according to dispatches. The city authorities had previously ordered the company to shut off its supply of energy to the camp in order that there might be no interference with city street lights. The cantonment authorities took control of the plant in order to safeguard their service.

The arrangement under which the Chillicothe company is furnishing service to the plant is a temporary one, pending completion of a 50-mile transmission line under construction by the Ohio Utilities Company, an associated corporation.

So far as can be learned by the ELECTRICAL WORLD at the time of going to press, the transmission line which is under construction from a point near Columbus will be fully completed on Oct. 1. After that date both the city of Chillicothe and Camp Sherman will be supplied from this line and the Chillicothe plant will be held as a reserve station. It had been anticipated that the transmission line would be finished on Sept 10 or 15, but delays in the arrival of materials, even with government assistance in hastening shipments, made completion impossible on schedule time. As the requirements for energy for Camp Sherman exceeded preliminary arrangements it had been proposed to shorten the street-lighting hours in Chillicothe about one hour each evening during the present week. No interference with the supply of energy for residences or power for any other purpose than street lighting was anticipated when this arrangement was made.

RAPID CONSTRUCTION WORK AT CAMP MAC ARTHUR, WACO

The Local Electrical Company Pushed Operations Systematically and Was Ready for Service on the Day the Troops Arrived

F. L. Booth, manager Texas Power & Light Company, Waco, Tex., writes to the ELECTRICAL WORLD regarding Camp MacArthur at Waco:

As soon as we were assured of the location of the camp, we obtained an approximate maximum demand and made a survey of the distribution system to take care of the load. We found it necessary to strengthen our circuits, and built about one-half mile extension to reach the camp site. We also had our engineers work out some of the details on the distribution in this camp, and when the army officers arrived we were able to give them considerable assistance in working out the details.

We are serving the camp with 400 volts to the entrance of the reservation, where a meter house is located and the service is metered on the primary.

The contractor installed the entire distribution system and wired all of the buildings and tents. We were able to handle our part of the work promptly and had everything in readiness when needed, providing a sufficient amount of material. As soon as the camp was located we were able to render considerable assistance to the contractor in securing material and men to push this work, and we are pleased to say that Camp MacArthur was ready to give service the day the troops arrived.

Double Taxation of Utilities.—The validity of an assessment of the easement of a telegraph company in public highways is not affected by the validity or invalidity of any gross earnings tax which it may be required to pay, the Court of Appeals of Maryland held (101 A. 600).

Employees Must Be Paid Immediately on Leaving Service.—The power of the Legislature to enact statutes requiring payment of wages to employees at once on their leaving the employment of a corporation is one of the police powers, the Supreme Court of Arizona held in Arizona Power Company versus State (166 P. 275).

Eminent Domain.—Where proceedings are instituted by a power company against a landowner to condemn property by law, and an appeal is taken from the award of the assessors, the company, not having taken possession of the land, may dismiss the condemnation proceedings pending the appeal, the Supreme Court of Georgia held in Georgia Railway & Power Company vs. Mooney (93 S.E. 206).

Use of Streets Without Franchise.—Use of streets for erection of poles to carry wires for street lighting is a street and not a municipal purpose, and any use which improves or benefits the street as a highway is a proper street use, according to the Supreme Court of New York (166 N. Y. S., 560). The Common Council of Brooklyn, by its right to contract with a corporation to furnish lights in the streets, had no power to confer on the corporation the right to furnish light to abutting owners for profit. The fact that a light, heat and power corporation used streets for several years and expended several millions of dollars on its plant did not create a franchise by estoppel. The fact that the State assessed a franchise tax on a light corporation did not constitute a recognition of a franchise by estoppel. A citizen and taxpayer may maintain mandamus to compel removal from streets of electric light poles which are owned by a company having no franchise.

Right of City to Construct Competing Plant.—A city invested with power to do so and having entered into a contract with a light company whereby it agrees not to erect or acquire a competing plant may be enjoined from violating such contract, the Supreme Court of Tennessee held in Memphis Electric Light, Heat & Power Company vs. the City of Memphis (196 S.W. 1113). Grants of franchises and special privileges are always to be construed most strongly against the donee and in favor of the public. An ordinance granting to the electric light company a franchise to operate its plant for an additional period of twenty years, with the usual privileges as to the use of streets, etc., but specifically providing that "this ordinance shall not be construed as being an exclusive franchise," and containing no language expressly prohibiting the city from exercising its powers to construct and operate an electric light plant, did not give plaintiff the exclusive right for twenty years, and defendant city could not be enjoined from constructing a municipal light plant before the expiration of such period. That the city reserved in the franchise granted the electric light company the right to purchase its plant at any time did not create an obligation on the part of the city so to do during the term of the franchise should it decide to construct a municipal light plant, such provisions of the franchise being a mere option to the city.

Recent Court Decisions

Findings of higher courts in legal cases involving electric light, power and other public utility companies.

Enforcement of Judgment Against City for Municipal Plant Supplies.—A municipal corporation can make a cash contract for necessary current supplies to be used in carrying on the legitimate business of the city, including the operating of its system of lights and waterworks, when made through its appropriate officers or committees, as effectually as when done by formal order or resolution of council entered in its minutes, where it appears that such contract of purchase has become obligatory through implied ratification by reason of the acceptance and use by it of the articles or supplies so contracted for, the Georgia Court of Appeals has held (93 S. E. 238). Where a suit is brought to recover the purchase price of supplies alleged to have been furnished the town as necessary to the present operation of its light and water plant, the municipality is entitled to plead and prove, by way of defense thereto, that at the time such alleged liability was incurred there was not a sufficient sum in its treasury which might have been lawfully used to pay it, and a sufficient sum could not have been raised by taxation during the current year for such purpose.

Duty to Anticipate Danger from Lightning.—It is a telephone company's duty to use the highest degree of care practicable in making and keeping safe its telephone apparatus, although it is not an insurer, the Missouri Court of Appeals held (196 S. W. 1030). Where one properly using a telephone was injured by electric shock, the doctrine of *res ipsa loquitur* applies, although the shock was or might have been caused by an electric storm, the occurrence being so unusual as to indicate that something was wrong with the instrumentalities which were solely under the telephone company's control, and it being the company's duty to guard against such possible injuries if they could be guarded against by the exercise of a high degree of care. The courts take notice that static electricity or lightning is likely to get on and pass over wires carrying manufactured electricity. A company whose wires enter a building is bound to anticipate that unless preventive devices are installed lightning may follow its wires into the building and cause personal injury, and if such company is negligent in the use of proper devices it will be liable for resulting injury, although the lightning may be considered an act of God, since the carrying of it into the building may be the act of the owner. A telephone company had the burden of proving that the presence of excessive electricity causing a telephone user's injury was not due to its negligence in failing to use the highest degree of care in installing and maintaining the telephone, the theory that *res ipsa loquitur* is only a rule of evidence supplying plaintiff with proof of negligence by mere proof of circumstances of the injury, and that the burden of proof remains with the plaintiff, not being law in the State.

Liability for Damages Caused by Flowage.—When land is taken in invitum by eminent domain the damages belong to the owner at the time of the taking, the Supreme Court of New Hampshire held in Spencer vs. Connecticut River Power Company of New Hampshire (101 A. 528). Although by statute a power company could acquire the right to flood lands of other owners and be relieved from common-law liability for so doing by payment or tender of damages, until such payment it is liable in tort at common law for the damage done by such flooding. Where a power company had caused lands of other owners to be overflowed but had taken no steps to dispossess the owners of their rights, deeds from such owners to plaintiff conveyed the lands unhampered by the right to flowage then unacquired. By law, if the owner of overflowed lands brings petition for assessment of damages, it must be dismissed if the power company disclaims the intention to take the right to flood the land, and the proceeding is only maintainable if the company desires to acquire such right.

Duty of Lighting Company in Respect to Telephone Company.—In a telephone lineman's action for injuries resulting from coming in contact with high-voltage wires, evidence was held to show that the telephone company's pole on which he was working at the time of the injury was erected after the electric light company's pole adjacent thereto, and that at that time the electric company's high-voltage wires were already in place. After erection of a telephone pole in close proximity to an electric light pole it became the electric company's duty to remove its high-voltage wires to the outer ends of its cross-beams for protection of telephone linemen and in accordance with the usual custom, the Court of Civil Appeals of Texas held in City of Weatherford Water, Light & Ice Company versus Veit (196 S. W. 986). An electric light company owes a duty to its employees to place its high-voltage wires on the outer ends of its cross-beams for their protection and in accordance with the usual practice. After a telephone pole was erected in close proximity to an electric light pole it was the electric company's duty toward the telephone company's employees to inspect the insulation of its high-tension wires.

Current News and Notes

Timely items on electrical happenings throughout the world, together with brief notes of general interest.

Increased Cost of Electric Light in Moscow.—Consul David B. Macgowan reports from Moscow, Russia, that owing to the rise in fuel and other costs and to increased wages Moscow electric light companies have increased charges for electricity 24 per cent.

Motor-Driven Steel Mill Starts at Mansfield, Ohio.—The Mansfield Sheet & Tin Plate Company started operating a motor-driven steel mill with a demand of about 3000 kw. on Sept. 17. The plant contains six hot mills, each driven through gearing by a 1500-hp. motor. There are also eight cold mills, each driven through gearing by 500-hp. motors. Energy is being supplied for the steel mill from the plant of the Mansfield Electric Light & Power Company.

Electrical Markets in South Africa.—Writing from Johannesburg, South Africa, United States Consul John P. Bray says: "British manufacturers still send most of the imports of electrical goods into this district. The United States exported $317,602 worth in 1916. American standards and specifications often differ from those used in South Africa. Japanese manufacturers sent large shipments here. The qualities and prices of their products are said to compare favorably with English goods."

Hydroelectric Energy Markets in Stavanger, Norway.—Reporting from Stavanger, Norway, United States Consul Maurice P. Dunlap writes: "One company that has been buying American material is the Electric Furnace Products Co. (Ltd.), which is operating with American capital and developing the water power in Saude, to be used in the manufacture of carbide. The Florli Company was formed during the year with a capital of $268,000, most of the stock being owned locally. This enterprise will obtain power from mountain lakes that empty into the Lysefjord. The needs of Stavanger for more electric power were apparent during 1916. The shortage of coal made it necessary to use all the energy available for power, lighting, heating and cooking. Temporary installations were made in as many private houses as could be accommodated, a maximum of 2 kw. being allowed each house. To utilize Norway's advantages in water power to the utmost is now the aim of the authorities. At Sirdal, in the southern part of this district, arrangements are being made to develop one of the waterfalls which will give 12,500 hp. at an estimated cost of $1,600,000 and a yearly expenditure of $165,000. This scheme will not be completed before August, 1919. In the meantime the water sources at Lake Oltedal, from which Stavanger's present hydroelectric power comes, are to be increased by 5000 hp., and that from Florli may be taken over."

Eighty per Cent of Park Lamps Are Incandescents.—Statistics gathered by the Bureau of the Census show that 80 per cent of the lamps in parks in 1916 were incandescent lamps. The use of arc lamps, gas lamps and other forms of illumination has fallen away considerably in the last ten years. The relative use of the different kinds of illuminants is shown in the following table:

	Per Cent of Total Number		
Type of Lamp	Park Lighting, 1916	Street Lighting, 1909	Street Lighting, 1907
Electric arc	8.5	34.5	34.2
Incandescent electric	80.1	16.3	10.6
Gas	6.2	41.5	45.1
All other	5.3	7.7	10.1

Overcoming Camouflage.—One of the Cleveland papers has discussed color principles, as illustrated by M. Luckiesh, physicist, research laboratory, National Electric Lamp Works, in their possible application to camouflage. By looking through colored glasses, it was said, American soldiers may be able to defeat the attempts of the enemy to deceive by the use of certain shades and colors. By using screens of contrasting colors with field glasses uniforms or objects of any kind may be made to appear in contrast instead of in harmony with the surroundings. Camouflage, as used in the French army, is accomplished largely by the use of paint, and objects are made to blend with their surroundings. This form of deception may be defeated, should the enemy attempt it, by the use of glass screens of various colors. Because of the difficulties in the way, the application of light on a large scale for this purpose has been impossible, but at the same time they may be overcome.

Electrical Equipment in Jamaica.—Consul Ross Hazeltine, Port Antonio, reports that American manufacturers furnish most of the electrical supplies and equipment used in Jamaica. There is no local manufacture of these products. The imports are grouped separately under two headings, as follows: (1) Apparatus necessary for generating, storing, conducting, converting into power or light, and measuring electricity, and (2) telegraph and telephonic wire and apparatus. The imports of both groups fall under the list of articles admitted duty free. During 1914 the imports of the first group amounted to $51,252 and in 1915 to $34,021 and the second group to $6,966 and $6,588 respectively. The United States supplies a large percentage of the electrical equipment imported into Jamaica. This condition may be attributed to the fact that in many instances the original installations consisted of American equipment. Electrical accessories such as irons, fans, vibrators and cooking utensils have no sale owing to the fact that the local electric light plant operates at night only.

Associations and Societies

A complete Directory of Electrical Associations is printed in the first issue of each month on the next-to-last text page.

San Francisco Section of the American Institute of Electrical Engineers.—At the regular meeting of this association, held Sept. 28, J. D. Galloway, chairman of the committee on engineering and inventions of the State Council of Defense, spoke on "The Civilian Engineer and the War," and Frank Rieber, of the Rieber Laboratories, spoke on "Engineering Problems of the War." A cordial invitation was extended to members of the American Society of Civil Engineers to attend.

Automatic Telephony as Applied to Industrial Plants.—The Philadelphia Section of the Association of Iron and Steel Electrical Engineers will meet on Oct. 6 at the Majestic Hotel. The speaker of the evening will be Thomas C. Thompson, of the Automatic Electric Company, Chicago, who will read a paper entitled "Automatic Telephony as Applied to Industrial Plants." The paper will be illustrated with lantern slides. For the November meeting every member is requested to prepare a short paper.

Philadelphia Meeting, A. I. E. E.—The three hundred and thirty-third meeting of the American Institute of Electrical Engineers will be held in Philadelphia on Oct. 8, under the auspices of the Philadelphia Section. The general subject of the meeting will be industrial research, and three papers will be presented by Dr. F. B. Jewett, C. E. Skinner and Dr. A. E. Kennelly. There will be afternoon and evening sessions and an informal dinner between the sessions. The regular monthly meeting of the board of directors will be held at 11 o'clock a. m., and several committee meetings will be held during the day.

International Association of Municipal Electricians.—The following officers for the ensuing year were elected at the annual meeting at Niagara Falls, N. Y., on Sept. 11 to 14: President, C. E. Diehl, Harrisburg, Pa.; first vice-president, J. H. Thomas, Scranton, Pa.; second vice-president, C. E. Convers, San Antonio, Tex.; third vice-president, R. C. Turner, Atlanta, Ga.; fourth vice-president, Arthur J. Bell, New Rochelle, N. Y.; secretary, Clarence R. George, Houston, Tex.; treasurer, W. H. Flandreau, Mount Vernon, N. Y.; executive committee, Jacob Grimm, Buffalo, chairman; Jay B. Franke, Perth Amboy, N. J.; Charles Downs, Altoona, Pa.; Arthur E. Platt, Bridgeport, Conn.; William Briggs, New Bedford, Mass.; James J. Mulcahey, Yonkers, N. Y.; W. L. Potts, Detroit; A. J. Balizet, Meadville, Pa., and John Berry, Indianapolis. The 1918 convention will be held in Atlanta.

C. E. DIEHL

Men of the Industry

Changes in Personnel and Position— Biographical Notes

Clark E. Diehl, the newly elected president of the International Association of Municipal Electricians, is manager of the Postal Telegraph office at Harrisburg, Pa., and is also connected with the municipal service of that city, having supervision of the fire-alarm and police patrol systems. Mr. Diehl learned telegraphy on the Pennsylvania Railroad lines and for a time worked for that company. He has been manager of the Postal office at Harrisburg ever since that company first started doing business, in the eighties. In 1897, after an unsuccessful effort on the part of Harrisburg to operate its fire and police alarm system with some degree of reliability, Mr. Diehl was requested by the mayor of the city to assume charge and endeavor to get the system in shape. Ample assistance was provided by the city, and in a very short time the department was organized and a reliable service provided. Ever since Mr. Diehl has continued to supervise the department. Although Mr. Diehl never had a purely technical education, he has been an ardent student and applied himself to the study of electricity in a practical way. He has perfected a number of inventions, one of which has been of great value in improving the quadruplex system of telegraphy.

Arthur Williams of the New York Edison Company has been appointed chairman of the Food Administration conservation campaign committee of New York City.

W. H. P. Hill, formerly with the Northwestern Electric Company, Portland, Ore., has been appointed sales manager of the Idaho Power Company, Boise, Idaho.

Harry Hollis has resigned from his position as electrical engineer for the Reading (Pa.) Transit Company to take a similar position with the Bethlehem Steel Company at Lebanon, Pa.

Rufus E. Lee, who several months ago relinquished his interests in the Lee Light & Power Company of Clarinda, Iowa, has been appointed general manager of the Nebraska Electric Company, Cedar Rapids, Iowa. The Nebraska Electric Company is an Iowa corporation, operating in towns in northeastern Nebraska, among which are Creighton, Wausa, Bazile Mills, Niobrara, Winnetoon, Bloomfield, Hartington, Wakefield and Emerson. Mr. Lee has been very active in State Association work and during 1914 was president of the Iowa Electrical Association.

Walter S. Finlay, Jr., has been appointed superintendent of motive power of the Interborough Rapid Transit Company and of the New York Railways Company to succeed the late H. G. Stott.

E. H. Davis, past-president of the National Electric Light Association and president of the Lycoming Edison Company, Williamsport, Pa., is recovering from a dislocated shoulder which he received in New York City from a fall.

C. C. De Bruler has resigned from the electric range sales force of the Milwaukee (Wis.) Electric Railway & Light Company, to accept the position as manager of electric range sales for the Colorado Power Company, Montrose, Col.

Prof. W. S. Franklin, formerly of Lehigh University, has accepted a position as special teacher and lecturer at the Massachusetts Institute of Technology, partly in the department of physics and partly in the department of electrical engineering.

Edward T. Moore, who has been with the Westinghouse Electric & Manufacturing Company for a number of years, has recently accepted a position with the Halcomb Steel Company and the Syracuse Crucible Steel Company, Syracuse, N. Y., as electrical engineer.

L. O. Veser, who for the last two and one-half years has been electrical superintendent for the Aluminum Company of America and the St. Lawrence River Power Company at Massena, N. Y., has resigned to accept a position on the engineering staff of the Electric Bond & Share Company in New York.

John H. Barker, until recently chairman of the fan section of the Associated Manufacturers of Electrical Supplies, has resigned as sales manager of the Diehl Manufacturing Company, with which he has been connected for more than eight years, to go into business for himself as manufacturers' agent in New York City.

Freling Foster, until recently advertising manager of the Hughes Electric Heating Company, Chicago, has joined the advertising staff of the Society for Electrical Development, with headquarters in New York. He will take the place made vacant by the resignation of E. M. Hunt, who has become connected with the *Review of Reviews.*

C. A. MENK

Charles A. Menk, formerly first vice-president of the Association of Iron and Steel Electrical Engineers, was elected president of the association at the eleventh annual meeting, recently held at Philadelphia. Mr. Menk has been in the employ of the Carnegie Steel Company at Homestead, Pa., for the last twenty-five years, during the last twelve years as superintendent of the electrical department.

I. B. Zimman, contract agent for the Nebraska Power Company, Omaha, Neb., has been placed at the head of the sales and service departments of the company in active charge of all of the company's dealings with the public.

Obituary

Robert K. Young, president of the Wellsboro (Pa.) Electric Company, died at the Blossburg Hospital, Wellsboro, on Sept. 12.

William P. Hancock, superintendent of the generating department of the Edison Electric Illuminating Company of Boston, Mass., died at his home in Boston Sept. 19. Mr. Hancock was one of the most widely known power-plant executives in the central station industry and was one of the strong men of the Edison operating systems of the country. He was born at Kennebunk, Me., in 1856, and after receiving his early education at Saco, Me., learned the millwright, brass and iron molder's trades, being employed for a time at the United States Navy Yard, Kittery, Me. Mr. Hancock's electrical work began with the New York Edison Company and later carried him to many parts of the country in connection with wiring installations with which he was associated. Twenty-five years ago he joined the staff of the Boston Edison company in connection with the building of the Atlantic Avenue station and rose steadily to the post of superintendent of the generating department. He was the winner of a medal some years ago at a convention of the National Electric Light Association, where he presented a paper on underground construction. Mr. Hancock was a member of the Engineers' Club of Boston and various other organizations.

REVIEW OF TRADE AND MARKET CONDITIONS

News of the Trade for the Manufacturer, Wholesaler and Jobber of Electrical Equipment and Supplies—Notes on Industrial Activities and Business Methods

GOVERNMENT FIXES PRICE FOR STEEL PRODUCTS

Priority Board to Control Distribution of Iron and Steel Through Licenses, Placing Private Interests Last in List

Government prices for steel products, showing decreases from 47 to 70 per cent over recent high prices, were announced in Washington on Monday, following a voluntary agreement by the steel interests and the War Industries Board. Certain of the raw materials necessary to the production of steel were also reduced in price.

The distribution of iron and steel will be placed under the absolute control of the Priority Board through licensing. Preference will be given to the War and Navy Departments and the Emergency Fleet Corporation of the United States Shipping Board. Next will come the supply for the needs of the Allies. Private interests not engaged in war work must wait until the last before obtaining supplies.

Although the new prices apply to all, it is very doubtful if they will cause any drop in prices of electrical goods into which steel enters largely. In fact, the control of iron and steel distribution may prove a great hardship to certain electrical manufacturers. It is now known that the government has restricted the supply of sheet steel to electrical manufacturers because the rolling mills were needed to turn out tinplate. Any further reduction in the supply of iron and steel will result therefore either in deliveries much more delayed or in the temporary withdrawal of certain articles from the market.

Conditions of supply and demand, however, have been so chaotic during the last two years that any stabilizing influence will be welcomed in many quarters. One of the leading executives in the electrical manufacturing industry, who is in a position to have the most authoritative information on conditions generally, said to a representative of the ELECTRICAL WORLD regarding the effect of the prices on electrical manufacturing:

"The effect will be wholesome and encouraging to enterprise. It will offer a relief from a runaway condition into which we have drifted."

AMERICA MAY GAIN TRADE IN ENGLISH LAMP MARKET

Recent Action of Dutch Government in Taking Coal Tar from Glass Factories Likely to Be Felt by Holland Lamp Industry

Glass factories in Holland have been notified by the Dutch government's coal distribution bureau that no more coal tar can be supplied. As a consequence at least some, if not all, of the ovens must cease working very soon. Should this action result in the shut-down of a large number of glass factories, the effect upon the market for American incandescent lamps becomes apparent.

During the last two or three years, although Holland has scarcely been able to export her lamps except in one direction, the exports have increased considerably, the imports of Dutch incandescent lamps into the English market having reached a large total.

It is not unreasonable to suppose that the action of the Dutch government may result in lessening the output of the Dutch lamp factories. In this event England will undoubtedly be in the market for an increasing number of American-made lamps. American manufacturers are now in a better position to supply this market than they were six months ago, but with the winter demands coming on and with the appeals from certain sections of the country, particularly the Far West and Middle West, for lamp stock, the manufacturers may be put to it to discover a way to supply all markets.

MOTOR DEMAND PUSHES DELIVERIES FURTHER BACK

It Is Estimated that Manufacturers Are Not Less than 150,000 Motors Behind, with Larger Sizes Particularly Hard to Obtain

Two years ago the electrical market began again to show signs of life, and then quickly it advanced into a boom market. One of the first lines to feel the quickened pulse of buying was motors, and ever since the late fall of 1915 deliveries on motors have been very tardy. To-day they are, on the whole, worse than they have ever been.

Inquiries into the condition of motor deliveries revealed an immense number of unfilled orders. In fact, it is now virtually certain that the manufacturers all together are no less than 150,000 motors behind in delivery.

In the larger sizes conditions are worst. There is a very active demand for motors of 500-hp. rating and larger, and it is well known that manufacturers are not able to keep pace with requirements.

There are indications that before the beginning of 1918 higher prices will be placed on motors. With the exception of an advance by one concern on very small motors a few days ago, prices have remained steady for some months.

It is still possible for buyers to meet their requirements if speed and make are not specified. Every week a number of motors, first of one size and then another, come on the market, and there is, therefore, a fair stock of miscellaneous equipment available.

Second-hand houses and speculators, foreseeing this condition last year and early this year, placed orders for future delivery, and these motors are now coming on the market. They are, however, being taken up very rapidly.

Stock in fractional horsepower sizes has long since ceased to exist. One large manufacturer has gone out of the open market and finds his hands full just supplying old customers. The demand for small motor-driven equipment has greatly increased since war was declared, principally because of the labor problem. The scarcity of domestic help has opened up a wide sale for washing machines, mangles, dishwashers, sewing-machine motors, etc. Fan motors were sold out this year, and therefore an entire new stock must be turned out before the early spring of 1918.

WIRE UNAFFECTED BY COPPER AT 23.5 CENTS

Establishment of a Government Price for All Finds Market Temporarily Upset, with No Sales at Announced Figure

On Sept. 21 the government price of 23.5 cents a pound for copper was announced. This price is for all, government, Allies and private purchasers. For weeks and weeks those vitally interested have awaited this announcement, only to find themselves more at sea now that it has been made than they were formerly. The copper market is in a very excited condition, but almost no business is being

done. Certain it is that there have been no transactions at 23.5 cents. On Monday last there were some sales at 26 cents, but none was reported at a lower price. Those who have a supply of the red metal seem loath to part with it while the atmosphere of the market is so cloudy. Buyers, moreover, were probably for the most part bargain hunting, and it is doubtful if there will be any real inquiries for any considerable tonnage until the government clears up a great many points now in doubt.

As for copper wire, the announcement of the 23.5-cent price has made no difference. Base is still firm at 36 cents, with an occasional manufacturer quoting at 35 or 37 cents. The wire manufacturers have contracted for copper long ahead at prices in excess of the government price, and consequently it is not reasonable to suppose that wire base will soften any, provided, of course, that the demand is maintained.

Wire for the government is, of course, a different proposition. The price is merely the conversion price, since the government furnishes the producers with the raw copper.

Wire manufacturers will make no predictions regarding the future. At present they are at sea and, as far as is possible, are refraining from buying any raw material. It seems to be pretty generally felt, however, that irrespective of the government price the law of supply and demand will prevail, unless the government makes some ruling to the contrary.

The price of 23.5 cents seems sufficient to guarantee a reasonable profit to all producers so that there is no apparent reason for curtailing production. A recent study made of producers' costs showed the highest cost to be a fraction over 20 cents a pound.

Deliveries are much better on copper, but it is well known that a large volume of buying has been deferred pending the settlement of the government price situation.

METAL MARKET CONDITIONS

Trade Is Considerably Upset Owing to the Announcement of Government Prices

The outstanding features of the week in metals were the announcements from Washington fixing the price of copper at 23.5 cents and reducing the price of steel products in some instances as much as 70 per cent. The trade, however, is not clear as to how the situation will work out, and therefore temporarily is considerably upset. There is virtually no trading on private account. Some sales were reported of copper at 26 cents, but none was recorded at the announced price.

Lead is continuing to show weakness and is now quoted at 8 cents, a drop of 3 cents within a comparatively short time. Spelter was somewhat firmer, but all of the old metals showed an inclination to fall off.

In view of the government price of 23.5 cents for copper, no other market quotations are being made either for spot or for future delivery.

NEW YORK METAL MARKET PRICES

	Sept. 17	Sept. 24
Copper:	£ s d	£ s d
London, standard spot	120 0 0	110 0 0
Prime Lake	27.00 to 27.75*	Govt. price 23.50
Electrolytic	26.37½ to 26.75*	Govt. price 23.50
Casting	26.25 to 26.62½*	Govt. price 23.50
Wire base	32.00 to 33.00*	32.00 to 33.00*
Lead, trust price	9.00	8.00
Nickel, ingot	50.00	50.00
Sheet zinc, f.o.b. smelter	19.00	19.00
Spelter, spot	8.30	8.42½
Tin, Straits	62.50	62.25
Aluminum, 98 to 99 per cent.	39.00 to 40.00*	39.00 to 40.00*

OLD METALS

Heavy copper and wire	25.00 to 25.50	23.00 to 23.50
Brass, heavy	15.50 to 16.50	14.00 to 15.00
Brass, light	11.50 to 12.00	11.00 to 11.50
Lead, heavy	7.50 to 8.00	6.50 to 7.00
Zinc, old scrap	6.00 to 6.25	6.00 to 6.25

*Nominal.

THE WEEK IN TRADE

IN GENERAL, business is the same as ever, although there was noticeable activity during the week in certain of the heating appliances, particularly radiators. Prices are remaining firm.

The government announcements of copper and steel prices have had no apparent effect on the market as yet. It is generally felt that prices of electrical goods into which these metals enter in any appreciable degree will not soften as a result of the government's price. Raw materials have been purchased long ahead and these prices will be the controlling factors.

Collections, on the whole, are fairly good, although there is not a great deal of optimism in this respect to be discovered among the jobbing trade.

NEW YORK

Cool weather registered its effect upon heating appliance sales this week, and other seasonable goods sold well. While in certain quarters the lamp market appears to be oversold, there is still a large volume of business to be handled during the next three months.

Prices have been firm and have shown no indication to be swayed by government prices on copper or steel.

A diminishing number of small orders is being noticed by local jobbers, indicating the dull condition in the contracting field. Large orders, however, are being very well maintained in volume.

CABLE.—The United States government within the last week purchased 300,000 ft. of lead-armored cable for different naval bases. The shipments have begun and are almost completed.

TRANSFORMERS.—In transformers, large and small sizes, the demand far exceeds the supply. In not a few instances deliveries are delayed from four to six months. This congested condition is due mainly to the inability of the manufacturers to obtain raw material in sufficient quantity. When goods are in hand they are distributed on the allotment plan; that is to say, by giving to each customer what can be spared at the time. Prices are firm, with an advance threatened in the near future.

INSULATORS.—High-tension insulators for switchboard work are having a strong demand which manufacturers are having difficulty in meeting owing to the congestion that prevails, charged up to the raw-material market.

MOTORS.—Figures from different manufacturers indicate that they are now not less than 150,000 motors behind in deliveries, with larger sizes particularly hard to obtain.

SECOND-HAND MACHINERY.—There is an active demand for motors, transformers and generators at top-notch prices. Equipment is becoming very scarce, and it is now impossible to obtain immediate deliveries on certain sizes and types.

POLES.—Chestnut poles are becoming very scarce because of the blight. An effort to obtain 400 poles on one order is meeting with considerable difficulty. Army camp construction in this vicinity has called for large quantities of poles.

WIRE.—The government price of 23.5 cents has had no apparent effect on the wire market. Wire base is firm at 36 cents. The government price brought forth no business or inquiries for wire so far as could be learned early in the week. The market for code wire is still off because of the dearth of new building, but the demand for submarine, subway and underground cable is sufficient to keep factories running at top speed.

ELECTRIC HEATERS.—There has been a very brisk demand for small heaters, principally of the radiant type, during the past week as a result of the cool weather. A

sale was also recorded during the week for a number of large electric radiators for the hospital at Camp Upton.

HEATING PADS.—The retail season will not begin for another month, but pads are now just beginning to move in quantities to the retailers.

LAMPS.—In certain quarters the market appears to be oversold. Prices remain unchanged, but an early advance is being discussed in keeping with the outlook for raw materials.

CONDUIT.—Rigid conduit is none too plentiful in supply, with flexible on an easier basis. The market is firm, with local deliveries slightly in arrears. Buying is normal and prices are unchanged. Discounts are becoming more limited as prices become harder on raw material.

COLLECTIONS AND CREDITS.—With manufacturers collections are very good, but, nevertheless, the chronic "slow-pays" require prodding, especially at the close of the month. Discounts are variable, according to circumstances and confronting conditions. Credits with jobbers are tightening up and contractors are advised to follow a like course. Collections are fairly satisfactory in this branch of the trade with a number of the leading houses, but not so good generally speaking. There is a feeling that money is by no means in liberal supply, and contractors who are careless in their collections or are furnishing estimates loosely drawn in respect to cost of material will be in a rather precarious condition within six months, if not before that time.

DELIVERIES.—Pipe is in better supply than it has been during the last three or four months, and deliveries from the manufacturers to jobbers are normal. Flexible lamp cord is still behind four or five months. The rubber-wire people, especially on large-size cables, are back six months. Manufacturers of wiring devices in which porcelain enters, such as entrance switches, fuse blocks, etc., are behind on deliveries from one month to three. This is owing to strikes at the Trenton potteries. Batteries are normal in regard to factory shipments.

CHICAGO

The trend of the copper-wire market, following the fixing of the 23.5 cent base by the government, is being watched with interest by Chicago jobbers. Just after the price was announced the market was a little weak, but the following day it loomed up stronger than ever. The best opinion is that fixing the base will have little effect on the wire market. Some believe this is true because of prices of other materials entering into insulated wire. Others think buyers who have been holding off will come into the market and that supply and demand will control the prices.

The jobbing business as a whole for the last two weeks has been a trifle weak. The expectation is that things will pick up in about two weeks or a month when the real fall buying gets under way. Credits and collections remain fair.

LUMINOUS AND OPEN-COIL RADIATORS.—Fall business has not yet opened up, although there have been a few cold days.

CROSS-ARMS.—Shipments from the Far West are getting better in spite of predictions that they would get worse. Vigorous buying is expected.

GLASS INSULATORS.—Prices are steady. This is a class of goods which has not advanced in proportion to other construction material.

LINE HARDWARE.—Jobbers are long on stock and stand ready to make prompt shipments.

LAMPS.—Every one is behind on orders for smaller sizes. There appears to be little relief in sight.

SOOT CLEANERS.—Manufacturers report growing interest and increased volume of business, due to desire to operate plants efficiently and to cut power-house labor.

ROTARY PUMPS.—Some manufacturers of rotary pumping equipment are seriously affected by shortage in small turbine and motor equipment for driving their pumps. On account of their inability to get the driving equipment, deliveries on the pumps have been held up after their completion at the factory.

BOSTON

Trade continues active, although business outside government and closely related affairs appears to be slowing down a little. Central stations are feeling the effects of the draft, especially in their sales departments, and in most cases little effort is being made to fill the vacant places. Contractors are very busy along industrial lines, notably in the Connecticut valley, where labor is particularly scarce. Some large residential wiring is being handled to advantage this fall. Electrical jobbers report credit conditions as rather slow. Many are hoping to get rid of stocks purchased at high price levels before lower prices set in as the result of government price regulation, but some jobbers feel that the latter will have little real effect on the market for some time. Little can be said in favor of better deliveries. In the telephone field the Massachusetts Public Service Commission has just condemned the war policy of the New England Telephone & Telegraph Company, which refused new residential installations except in emergency cases. In its finding the board points out that there has been no national movement in this direction in Bell circles and cites the company's own evidence and recent advertising and sales of the Western Electric Company of electric household appliances as an indication that there has been no serious shortage of the raw material. Electrical manufacturing interests in the Connecticut valley report increasing volume of government business, a shortage of labor, with openings increasing for women, a fair volume of purely industrial trade, considerable difficulty in obtaining raw materials, and little prospect of price reductions at present. Isolated plants are coming over to central station service at Boston.

ELECTRIC MOTORS.—A brisk demand still makes it difficult for manufacturers to stock up all along the line, though odd sizes are plentiful for immediate delivery. Prices remain firm and are probably 40 per cent higher than eighteen months ago, on the average.

HEATING PADS.—Increased sales are reported, especially to elderly persons among retail buyers. These pads are being utilized on sleeping porches this fall to great advantage.

FLASHLIGHTS.—Military trade holds well, and 5500 were sold recently in a single afternoon to guardsmen encamped on the Yale Field, New Haven, Conn. Shortening days will increase the normal commercial demand for these equipments.

ELECTRIC RADIATORS.—A brisk demand is noted. The failure of anthracite coal to go lower in price means heavier sales of these units in October and November. No price changes are noted.

TABLE APPLIANCES.—Manufacturers are shipping in substantial lots to jobbers for the holiday trade, and the outlook for the latter appears excellent. The increasing difficulty of the servant problem is proving a strong factor in electric cooking developments.

METER-TESTING APPLIANCES.—A steady demand for fixed and portable sets is noted. Raw materials are rather scarce, and prices show little prospect of immediate change.

SEARCHLIGHTS.—Very heavy government orders are being handled.

ELECTRIC PLEASURE CARS.—Something of a boom is noted in this equipment in the Hartford district, due to the drafting of chauffeurs for the conscript army. Gasoline-car owners are planning in not a few cases to put up their engine-driven cars and buy electrics for easy operation. Deliveries are better than last year, though still somewhat slow.

INDUSTRIAL ELECTRIC TRUCKS.—These are increasing in popularity, and many inquiries are coming in to agents of standard makes. Dealers are very active in investigating factory operating problems.

PORTABLE LAMPS AND FIXTURES.—Trade is still rather quiet, but it is anticipated that the demand for portables will soon increase.

SMALL STEAM TURBINES.—Day and night work is the rule in the most representative factory production.

Government orders are very active, notably for naval service. Some exemptions have been obtained from the federal authorities, so that the labor situation is somewhat better than in lines less closely related to the war. Prices continue high, and long deliveries still are the order of the day on these machines.

AUTOMATIC COAL-WEIGHING APPARATUS.—Demand is strong, raw materials and labor are difficult to obtain, and prices are firm, with pig iron at $52 per ton against $18 normally and steel 10 cents per pound against 2 cents prior to the war. Nothing can be expected in the way of lower prices at present.

ELECTRIC SWITCHES, CABINETS AND PANELS.—Heavy marine orders are being handled at the factories. Labor is scarce, even for light assembly work, and women are in demand as well as men. Prices hold firm. The volume of business is below that of last year. Some increase in factory facilities is noted under construction.

ATLANTA

Conditions have not changed materially since last week, all lines continuing strong. The erection of a number of shipbuilding plants for both wood and steel tonnage is contemplated at a few of the Southeastern ports. The plants of this nature now in operation and those under construction have stimulated the demand for electrical marine supplies, showing a marked increase in volume for the last few months.

In addition to the private interests, the government is planning some large extensions to docks on the South Atlantic seaboard which will call for considerable electrical equipment, but as these plans have not fully matured, nothing definite can be said at this time.

The Tennessee Coal & Iron Company, Birmingham, Ala., placed an order amounting to $750,000 last week with a large manufacturer for electrical equipment.

Collections covering the Southeastern section appear to be holding up well.

FARM LIGHTING OUTFITS.—One manufacturer reports a very substantial business, and the volume of orders is increasing daily to a point where the factory is 800 to 1000 outfits behind. For this year to date these sets have advanced approximately 25 per cent over last year, causing an accelerated demand prior to each increase. Deliveries during the early part of this year were made in two weeks, but at this time no outfits can be secured in less than six to eight weeks. A further slowing up in deliveries is expected, as the government has taken over the new plant of one of the larger manufacturers for the purpose of turning out complete aeroplanes and ignition systems for the new Liberty air motors.

RIGID CONDUIT.—There is visible lessening in the demand for both the black enamel and galvanized products. A report from an authentic source indicates a slight weakness in this material, as the price has been shaded on large lots for two weeks' delivery. This reduction may be only local and temporary, as there is nothing in the wind that would lead to a general decline, unless the raw material situation has improved.

PANELBOARDS.—Business in the past week for these has been excellent, as evidenced by good orders placed in Atlanta and New Orleans. Shipments are being made in two to three weeks.

STAMPED-STEEL BOXES.—This line seems to be following closely the trend of rigid conduit, showing a corresponding dullness.

STEEL MILL MOTORS.—Considerable activity exists in this line, owing to the extensive plans that the mills have in view. Some of these plans have culminated to the extent of large immediate contracts.

METERS.—Several manufacturers report an advance of from 15 to 20 per cent on both direct-current and alternating-current types. This increase will not affect present outstanding meter contracts. Deliveries remain about the same

SEATTLE

During the past week there has been a noticeable increase in demand for household appliances, particularly washing machines, electric irons, toasters and socket-device heaters. Heaters have just begun to move well and heavy sales are expected. Sales on domestic appliances and heaters are being pushed. The results obtained in suburban towns in this territory are very satisfactory. Anticipated demand for lamps is materializing and is double the available supply. Factories are making a strenuous effort to supply orders and are making some headway, though shipments are coming through very slowly and a shortage is feared. Prices remain firm with no intimation of increases. It is reported that the demand from the government for construction work under way at the navy yard at Bremerton is resulting in a remunerative business for local dealers. Orders are being placed for motors, generators, wiring devices, wire, fixtures, and an inter-telephone system for the hospital unit and cottages under way. The electrical wiring and fixture contract on the proposed nine-story million-dollar warehouse at Bremerton will be let in a short time.

Award of the contract for the construction and equipment of a steam auxiliary unit to Seattle's present municipal power plant on Lake Unit will result in excellent machinery and equipment contracts for Seattle dealers, as will the award of the contract for the two-mile extension of Seattle's municipal street railway division.

Sales of machinery and equipment, including motors, large and small, generators, etc., were about the same as last week. A temporary decrease in demand from wooden shipyards, due to the strike, was offset by a slight increase in demand from lumber mills which are reopening. There were no particularly large sales during the week, but the volume was very satisfactory. The effect of the carpenters' strike was not noticed, mainly because of its short duration, about one week. Dealers were not alarmed to any extent as business from builders is inconsiderable owing to the minimum amount of building. Demand from steel shipyards is normal.

Ordering for future stocks is very light. Dealers will not load up with high-priced stocks. Reports from Portland state that dealers experienced a normal week with satisfactory demands from shipyards and mills. Building is very light. Tacoma is exceptionally lively because of cantonment work and building. In Spokane building is light and other activities are normal. Credits and collections in Seattle were pleasing.

Conditions in the lumber industry in the Pacific Northwest show marked improvement. Lumber production in a week increased 60,841,213 ft. at 149 mills, notwithstanding sectional agitation by labor organizations against the so-called ten-hour day. Lumber business booked for strictly local trade established a new record in the industry, with a total of 9,389,763 ft. The Metal Trades Council, representing steel shipyard workers in Seattle, may call a strike immediately. Press dispatches from Portland dated Sept. 23 state that 5600 employees of steel shipbuilding plants were to go out on Sept. 24.

SAN FRANCISCO

Business has been fair during the past week. The demand for heating appliances shows an increase. Dealers are commencing to stock up for holiday trade. The advance in prices on Sept. 15 makes little difference in demand. Vacuum cleaners are selling well, and the demand for washing machines continues. Sales of electric ranges are slowing up, the season being about over; however, the fall season has been very satisfactory. The strike of metal workers has indirectly slowed up business in industrial lines somewhat. The activity of the electrical trade generally has been affected by the unsettled condition existing in San Francisco due in part to the strike and in part to preparations for the departure of drafted men the latter part of the week. Collections are holding up to normal fairly well, though they are not quite so good as was the case during the previous week.

Current Prices of Electrical Supplies

NEW YORK AND CHICAGO QUOTATIONS

The prices quoted are those prevailing in standard packages or specified lots on apparatus and appliances in Eastern and Middle West markets at the beginning of business on Monday of this week. They are in all cases the net prices or prices subject to discounts from standard lists of contractors, central stations, dealers and others engaged in the resale of such goods.

Prices in Southern and other nearby markets will rule about the same as those in the Middle West, although slight modifications to cover increased freight and local demands should be expected. In the Far West and on the Pacific Coast the prevailing prices are naturally higher, covering as they must increased freight and the necessity of larger stocks with increased interest and warehouse charges on account of the distances from sources of supply, infrequent turnover of stock and uncertainty as to delivery of goods in transit. Moreover, the Far West presents a wide variation in demand due to a small population spread over a wide area in agricultural and mining communities, as contrasted with the denser population of the East and Middle West, their nearness to the source of supply, the more frequent turnover in stocks and the constant demands which arise in industrial centers.

The variation in prices may be due to the difference in grade of products made by different manufacturers, to local conditions, or to both.

ARMORED CONDUCTORS, FLEXIBLE STEEL

Single-Conductor

B. & S. Size	List, per 1000 Ft.
No. 14 solid	$61.00
No. 12 solid	71.00
No. 10 solid	90.00
No. 8 solid	106.00
No. 6 solid	145.00
No. 10 stranded	95.00
No. 8 stranded	115.00
No. 6 stranded	160.00
No. 4 stranded	205.00
No. 2 stranded	266.00
No. 1 stranded	315.00

Twin-Conductor

No. 14 solid	104.00
No. 12 solid	135.00
No. 10 solid	185.00
No. 8 stranded	235.00
No. 6 stranded	370.00
No. 4 stranded	575.00

NET PRICE PER 1000 FT.—NEW YORK

Single-Conductor

No. 14 solid:	
Less than coil	$61.00
Coil to 1000 ft	59.17
No. 12 solid:	
Less than coil	71.00
Coil to 1000 ft	68.87

Twin-Conductor

No. 14 solid:	
Less than coil	$104.00
Coil to 1000 ft	80.00
No. 12 solid:	
Less than coil	135.00
Coil to 1000 ft	130.95

DISCOUNT—CHICAGO

Single-Conductor

Less than coil	+10%
Coil to 1000 ft	—10%

Twin-Conductor

Less than coil	+10%
Coil to 1000 ft	—10%

ATTACHMENT PLUGS

List ranges from $0.22 to $0.30 each.
Standard packages from 100 to 250.

DISCOUNT—NEW YORK

Less than 1/5 std. pkg	10% to +10%
1/5 to std. pkg	10% to 20%
Std. pkg.	34% to 44%

DISCOUNT—CHICAGO

Less than 1/5 std. pkg	12% + 20%
1/5 to std. pkg	20% to list
Std. pkg.	30% to 44%

BATTERIES, DRY

NEW YORK

Each Net	No. 6 Regular	No. 6 Ignitor
Less than 12	$0.40	$0.40
12 to 50	.35	.35
50 to barrel	.31 to .3175	.32 to .3275
Barrel lots	.28 to .2875	.29 to .2975

BATTERIES, DRY—Continued

CHICAGO

Each Net	No. 6 Regular	No. 6 Ignitor
Less than 12	$0.40	$0.40
12 to 30	.35	.35
50 to barrel	.3175	.3275
Barrel lots	.2875	.2975

CONDUIT, METALLIC FLEXIBLE

Size, In.	Ft. Per Coil	List, Per 100 Ft.
5/16	250	$5.00
3/8	250	7.50
1/2	100	10.00
3/4	50	13.00
1	50	21.00
1 1/4	50	26.00
1 1/2	25–50	35.00
2	25–50	45.00
2 1/2	25–50	52.00

NET PER 1000 FT.—NEW YORK

	Less Than Coil	Coil to 1000 Ft.
3/8-in. single strip	$75.00	$69.75
3/8-in. double strip	75.00	72.00
1/2-in. single strip	100.00	93.00
1/2-in. double strip	100.00	96.00

NET PER 1000 FT.—CHICAGO

	Less Than Coil	Coil to 1000 Ft.
3/8-in. single strip	$75.00	$63.75
3/8-in. double strip	78.75	71.25
1/2-in. single strip	100.00	85.00
1/2-in. double strip	105.00	85.00–95.00

CONDUIT, NON-METALLIC FLEXIBLE

Size. In.	List Per Foot	Size. In.	List Per Foot
7/32	$0.05 1/2	1	$0.25
1/4	.06	1 1/4	.33
3/8	.09	1 1/2	.40
1/2	.12	1 3/4	.47
5/8	.15	2	.55
3/4	.18	2 1/4	.65

NET PER 1000 FT.—NEW YORK

Less Than $15 List	$15 to $60 List	$60 to $150 List
7/32-in.— $55.00	$24.50	$21.50
1/4-in.— 60.00	27.00	23.50

NET PER 1000 FT.—CHICAGO

Less Than $15 List	$15 to $60 List	$60 to $150 List
7/32-in.— $36.67-$55.00	$27.50	$23.10-$24.75
1/4-in.— $40.00-$60.00	$30.00	$25.20-$27.00

CONDUIT, COUPLINGS AND ELBOWS, RIGID IRON

Card No. 38

Size, In.	Conduit, List per Foot	Couplings, List	Elbows, List
1/4	$0.08 1/2	$0.05	$0.19
3/8	.08 1/2	.06	.19
1/2	.08 1/2	.07	.19
3/4	.11 1/2	.10	.25
1	.17	.13	.37
1 1/4	.23	.17	.45
1 1/2	.27 1/2	.21	.60
2	.37	.28	1.10
2 1/2	.58 1/2	.40	1.80
3	.76 1/2	.60	4.80

DISCOUNT—NEW YORK

	1/4 in. to 1/2 in.	3/4 in. to 3 in.
Less than 2500 lb	6%	8%
2500 to 5000 lb	9%	11%

(For galvanized deduct six points from above discounts.)

DISCOUNT—CHICAGO

	1/4 in. to 1/2 in.	3/4 in. to 3 in.
Less than 2500 lb	3.8%	5.8%
2500-5000 lb.	6.8%	8.8%

(For galvanized deduct six points from above discounts.)

FLATIRONS

NEW YORK

List price	$5.00
Discount	30%

CHICAGO

Net	$3.75 net	$4.50 net

FUSES, INCLOSED

250-Volt	Std. Pkg.	List
3-amp. to 30-amp.	100	$0.25
35-amp. to 60-amp.	100	.35
65-amp. to 100-amp.	50	.90
110-amp. to 200-amp.	25	2.00
225-amp. to 400-amp.	25	3.60
450-amp. to 600-amp.	10	5.50
600-Volt		
3-amp. to 30-amp.	100	$0.40
35-amp. to 60-amp.	100	.60
65-amp. to 100-amp.	50	1.50
110-amp. to 200-amp.	25	2.50
225-amp. to 400-amp.	25	5.50
450-amp. to 600-amp.	10	8.00

DISCOUNT—NEW YORK

Less than 1/5 std. pkg	28%
1/5 to std. pkg	38%

DISCOUNT—CHICAGO

Less than 1/5 std. pkg	28%
1/5 to std. pkg	38%

FUSE PLUGS

3-Amp. to 30-Amp.

NEW YORK

	Per 100 Net
Less than 1/5 std. pkg.	$5.75
1/5 to std. pkg.	4.50

Standard package, 500. List, each, $0.07.

CHICAGO

	Per 100 Net
Less than 1/5 std. pkg.	$6.25
1/5 to std. pkg.	5.25

Standard package, 500. List, each, $0.07.

LAMPS, MAZDA

105 to 125 Volts

	Std. Pkg.	List, Each
Regular, clear:		
10 to 40-watt—B	100	$0.27
60-watt—B	100	.36
100-watt—B	24	.65
75-watt—C	50	.65
100-watt—C	24	1.00
200-watt—C	24	2.00
300-watt—C	24	3.00
Round bulbs, 3½ in., frosted:		
15-watt—G 25	50	.50
25-watt—G 25	50	.50
40-watt—G 25	50	.50
Round bulbs, 3¾ in., frosted:		
60-watt—G 30	24	.72
Round bulbs, 4⅝ in., frosted:		
100-watt—G 35	24	1.05

DISCOUNT—NEW YORK

Less than std. pkg.	Net
Std. pkg	10%

DISCOUNT—CHICAGO

Less than std. pkg.	Net
Std. pkg	10%

LAMP CORD

Cotton-Covered, Type C, No. 18

NEW YORK

	Per 1000 Ft. Net
Less than coil (250 ft.)	$34.88
Coil to 1000 ft.	26.52

CHICAGO

	Per 1000 Ft. Net
Less than coil (250 ft.)	$36.88 to $37.20
Coil to 1000 ft.	27.66 to 27.90

LAMP GUARDS, WIRE

Standard packages from 50 to 150.

NEW YORK

Net per 100	$20.00 to $29.00

CHICAGO

Net per 100	$24.00 to $38.35

OUTLET BOXES

Nos.	List, per 100.
101—A, A1½, 4 S.C., 6200, 320	$30.00
102—B.A., 6200 S.E., 300, AX., 1½, 4 S	30.00
103—C.A., 9, 4R, B 1½	25.00
106—F.A., 7, C.S. 1½, 3 R	20.00

DISCOUNT—NEW YORK

	Black List	Galvanized List
Less than $10.00 list	42%	37%
$10.00 to $50.00 list		

DISCOUNT—CHICAGO

	Black	Galvanized
Less than $10.00 list	40%	35%
$10.00 to $50.00 list	50%	45%

PIPE FITTINGS

DISCOUNT—NEW YORK

Less than 1/5 std. pkg.	10%
1/5 to std. pkg.	20%
Std. pkg.	30%

DISCOUNT—CHICAGO

Less than 1/5 std. pkg.	10%
1/5 to std. pkg.	20%
Std. pkg.	30%

PORCELAIN CLEATS—UNGLAZED

2 and 3 Wire

NEW YORK

	Per 1000 Net
Less than 1/5 std. pkg.	$20.00
1/5 to std. pkg.	15.00

Standard package, 2200. List per 1000, $20.

CHICAGO

	Per 1000 Net
Less than 1/5 std. pkg.	$15.80 to $20.54
1/5 to std. pkg.	13.00 to 19.24

Standard package, 2200. List per 1000, $20.

PORCELAIN KNOBS

NEW YORK

Per 1000 Net	Std. Pkg. 3500 5½ N.C.—Solid	Std. Pkg. 4000 Nail-it—N.C.
Less than 1/5 std. pkg.	$24.30	....
1/5 to std. pkg.	12.15	....

CHICAGO

Per 1000 Net	Std. Pkg. 3500 5½ N.C.—Solid	Std. Pkg. 4000 Nail-it—N.C.
Less than 1/5 std. pkg.	$11.85 to $18.00	$20.75 to $30.75
1/5 to std. pkg.	9.00 to 11.10	16.30 to 24.20

SOCKETS AND RECEPTACLES

	Std. Pkg.	List
⅛-in. cap key and push sockets	500	$0.33
⅛-in. cap keyless socket	500	.30
⅛-in. cap pull socket	250	.60

DISCOUNT—NEW YORK

Less than 1/5 std. pkg.	Net
1/5 to std. pkg.	20%

DISCOUNT—CHICAGO

Less than 1/5 std. pkg.	Net
1/5 to std. pkg.	15%

SWITCHES, KNIFE

250-Volt, Front Connections, No. Fuse

High Grade:	List
30-amp. S. P. S. T.	$0.80
60-amp. S. P. S. T.	1.20
100-amp. S. P. S. T.	2.25
200-amp. S. P. S. T.	3.48
300-amp. S. P. S. T.	5.34
30-amp. D. P. S. T.	1.20
60-amp. D. P. S. T.	1.78
100-amp. D. P. S. T.	3.38
200-amp. D. P. S. T.	5.20
300-amp. D. P. S. T.	8.00
30-amp. 3 P. S. T.	1.80
60-amp. 3 P. S. T.	2.68
100-amp. 3 P. S. T.	5.08
200-amp. 3 P. S. T.	7.80
300-amp. 3 P. S. T.	12.00
Low Grade:	
30-amp. S. P. S. T.	0.42
60-amp. S. P. S. T.	0.74
100-amp. S. P. S. T.	1.50
200-amp. S. P. S. T.	2.70
30-amp. D. P. S. T.	0.68
60-amp. D. P. S. T.	1.22
100-amp. D. P. S. T.	2.50
200-amp. D. P. S. T.	4.50
30-amp. 3 P. S. T.	1.02
60-amp. 3 P. S. T.	1.84
100-amp. 3 P. S. T.	3.76
200-amp. 3 P. S. T.	6.76

DISCOUNT—NEW YORK

Less than $10 list	Plus 5% to 5%
$10 to $25 list	11% to 16%
$25 to $50 list	14% to 24%

DISCOUNT—CHICAGO

Less than $10 list	+5%
$10 to $25 list	11% to 16%
$25 to $50 list	14% to 24%

SWITCHES, SNAP AND FLUSH

5-Amp. and 10-Amp., 125-Volt Snap Switches

	Std. Pkg.	List
5-amp. single-pole	250	$0.28
5-amp. single-pole, ind.	250	.32
10-amp. single-pole	100	.48
10-amp. single-pole, ind.	100	.54
5-amp., three-point	100	.54
10-amp., three-point	50	.76
10-amp., 250-volt, D. P.	100	.66

SWITCHES, SNAP AND FLUSH—Cont'd

10-Amp. 250-Volt Push-Button Switches

	Std. Pkg.	List
10-amp. single-pole	100	$0.45
10-amp. three-way	50	.70
10-amp. double-pole	50	.70

DISCOUNT—NEW YORK

Less than 1/5 std. pkg.	Net
1/5 to std. pkg.	15%
Std. pkg.	28%

DISCOUNT—CHICAGO

Less than 1/5 std. pkg.	Net
1/5 to std. pkg.	15%
Std. pkg.	30%

SWITCH BOXES, SECTIONAL CONDUIT

Union and Similar	List Each
No. 155	$0.34
No. 160	.60

DISCOUNT—NEW YORK

	Black	Galvanized
Less than $2.00 list	List	..
$2.00 to $10.00 list	20%	..
$10.00 to $50.00 list	30%	..

DISCOUNT—CHICAGO

	Black	Galvanized
Less than $2.00 list	25% to 50%	15% to 40%
$2.00 to $10.00 list	25% to 50%	15% to 40%
$10.00 to $50.00 list	34% to 64%	25% to 42%

TOASTERS, UPRIGHT

NEW YORK

List price	$6.00
Discount	30%

CHICAGO

Net price	$3.38 net to $3.75 net

WIRE, ANNUNCIATOR

NET PRICE—NEW YORK

No. 18, less than full spools	$0.52
No. 18, full spools	0.48

CHICAGO

	Per Lb. Net
No. 18, less than full spools	$0.065 to $0.6885
No. 18, full spools	0.5285 to 0.55

WIRE, RUBBER-COVERED, N. C.

Solid-Conductor, Single-Braid

NEW YORK

	Price per 1000 Ft. Net		
No.	Less than 500 Ft.	500 to 1000 Ft.	1000 to 5000 Ft.
14	$18.00	$14.00	$11.25
12	27.93	23.94	19.85
10	39.20	33.60	28.00
8	55.44	47.52	39.60
6	87.78	75.24	62.70

CHICAGO

	Price per 1000 Ft. Net		
No.	Less than 500 Ft.	500 to 1000 Ft.	1000 to 5000 Ft.
14	$18.00	$16.00	$14.00
12	28.63	24.54	22.50
10	34.44-40.28	31.57-34.44	28.70-31.57
8	48.84	44.77	40.70-44.77
6	70.24-70.80	63.85-64.00	57.47-57.60

WIRE, WEATHERPROOF

Solid-Conductor, Triple-Braid, Size 4/0 to 8 Inc.

NEW YORK

	Per 100 Lb. Net
Less than 25 lb.	$40.25
25 to 50 lb.	39.25
50 to 100 lb.	38.25

CHICAGO

	Per 100 Lb. Net
Less than 25 lb.	$42.00 to $43.50
25 to 50 lb.	41.00 to 42.50
50 to 100 lb.	40.00 to 41.50

NEW APPARATUS AND APPLIANCES

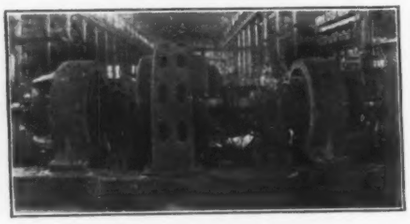
A Record of Latest Developments and Improvements in Manufacturers' Products Used in the Electrical Field

Hand-Operated Fire Extinguisher

The Fire Gun Manufacturing Company, 17 Battery Place, New York City, has developed a fire gun which it claims is a positive double-acting liquid pump, which will throw extinguishing fluid from 30 ft. to 40 ft. (9.1 m. to 12.2 m.). It is claimed that this gun will expel the entire quantity of fluid with less labor than is necessary to empty similar devices, as it requires about one-half the number of strokes. Both in and out strokes operate. The fluid used as the extinguishing agent is a non-conductor of electricity, is non-freezing, and will not injure the finest fabric or delicate machinery, it is claimed. This gun is made in two sizes, the smaller having a capacity of nearly 1¼ qts. (1.1 l.), designed especially for automobile use, and the larger having a capacity of nearly 1¾ qts. (1.6 l.) for household, factory and fire department use.

Motor-Generator Sets

Two rubber-manufacturing companies in Ohio have each recently installed two three-wire direct-current motor-generator sets that in construction are a departure from the usual practice. Instead of being of the old four-bearing, three-unit type or the two-unit type with a three-wire generator as one of the units, these sets consist of three units with only two bearings. These sets, which were designed and built by the Crocker-Wheeler Company, Ampere, N. J., consist of a 845-kva., 2200-volt, 60-cycle, three-phase synchronous motor driving two 250-kw., 125-volt, compound-wound interpole generators.



SET CONSISTS OF THREE UNITS WITH TWO BEARINGS

As compared with the old four-bearing, three-unit construction, these two-bearing units are much simpler in construction and have the following advantages as pointed out by the manufacturer. The absence of outboard bearings makes the brushes more accessible for adjustment and the unit can be assembled, dismounted and cleaned more readily. Perfect bearing alignment can also be obtained with greater ease, as self-aligning bearings are used. The machines can hence be erected with less labor. Because of the shorter length of the set less floor space is required. Couplings, which in some cases constitute a weak link, are eliminated.

Light-Directing Shades for Street-Lighting Fixtures

Two new light-directing shades have been added to the Novalux street-lighting fixtures made by the General Electric Company of Schenectady, N. Y. A 20-in. (50.8-cm.) radial wave dome reflector, recently developed, has a large hand-hole to enable the socket and lamp to be easily removed as a unit. This dome not only adds to the appearance of the reflector, but it provides reflecting surface for every ray of light above the horizontal. The interior is white-enameled, even above the socket,

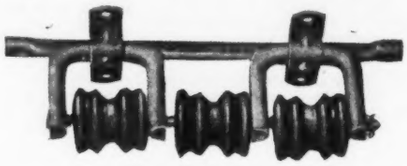
BAND REFRACTOR FOR STREET LIGHTING

so that the only light lost is the light cut off by the lamp base—a negligible percentage. An additional feature of this reflector pointed out is the fact that the edge of the rim is turned over and then enameled. This rolled edge prevents splitting of the enamel during handling or operation, and, according to the manufacturer, has the additional advantage of making the reflector absolutely impervious to rust.

The band refractor is a development of the prismatic refractor which was placed on the market a few months ago. It consists of two clear-glass bands, one of which fits snugly inside of the other. The joints are sealed to make a weather-proof union. The inner part is girdled on its outer surface by horizontal prisms which refract the light from the source at an angle of 10 deg. below the horizontal. The outer part has vertical diffusing prisms on its inner surface for the purpose of spreading the light rays transversely and making the refractor luminous over its entire surface. The two prismatic surfaces come close together when the parts are sealed, and the inner and outer surfaces of the complete refractor are entirely smooth.

Secondary Wire Rack

The wire rack shown herewith is a lighter form of the No. 350 Peirce secondary rack made by Hubbard & Company of Pittsburgh, Pa. This rack is designed to carry No. 3 B. & S. gage



LIGHT WIRE RACK

and lighter wire secondary mains on poles and service wires on buildings as well as work which does not require the strength of the heavy rack. This rack is similar to the original rack using spool insulators and steel brackets.

Changeable Sign That Harmonizes with Surroundings

A changeable-letter indoor electric sign that can be made to harmonize with the color and architectural characteristics of any store surroundings is being manufactured by the Viking Sign Company, Inc., 527 Fifth Avenue, New York City. The sign in its simplest form consists of an oblong box equipped with one or more standard electric bulbs. The face carries interchangeable molded glass letters, permitting the formation of any desired name or sentence.

The glass letters are mounted in metal plates which slide snugly in the grooves forming the front edge of the box. There is a second groove directly behind the letter groove in which color screens may be placed when it is desired that the letters shall radiate colors other than natural white. Aside from novel effects, the color feature has the advantage of permitting the sign to be made to harmonize with any fabrics or wearing apparel displayed near the sign or in contrast or harmony with any interior color scheme.

In order to make the sign fit in with the architectural features of stores and display windows the box may be fitted with various types of decorations and pedestals. The signs are normally furnished in statuary bronze color, although special colors are furnished on order. The outfits are completely equipped with lamps and plugs, and the manufacturer calls attention to the fact that the electrical features have been approved by the Underwriters' Laboratories.

Small Hot Plate

Electric stoves in which the heating unit consists of coiled wire of nickel chromium, which is suspended in circular grooves in the casting of the top plate, are made by the Simplex Electric Heating Company of Cambridge, Mass.

HEATING ELEMENT IS ENTIRELY INCLOSED

The stove shown in the accompanying illustration is an 8-in. (20.3-cm.) disk stove arranged for three heats and has a maximum wattage of 1200. The coil is supported at intervals with mica. It is entirely inclosed and, it is pointed out, the heat generated in the wire radiates directly to the stove casting without having to force itself through heavy insulating material. Attention is also called to another advantage of this method, which is that the manufacturers are able to use a much greater length of resistance wire and a relatively greater thickness. This, it is claimed, helps in strength and durability.

Motorless Flasher

The motorless flasher made by the Betts & Betts Corporation, 511 West Forty-second Street, New York City, has a circular box containing a glass tube from which the air has been exhausted. A puddle of mercury floats in the tube, and in each end as well as the center there is a platinum leading-in wire. A rocking arm is operated by resistance wires, these heating and cooling continually while the flasher is in operation. The rocking arm is attached to the metal case containing the tube, which is thus tilted back and forth, either "making" and "breaking" a circuit or alternating two circuits as the case may be. Since there is no oxygen in the tube, the maker points out there is no deterioration in the contact surface.

Vertical-Type Electric Broiler

For hotels, restaurants, clubs, etc., where there is a large demand for broiled meats, the Hughes Electric Heating Company, 5660 West Taylor Street, Chicago, recommends its vertical-type three-compartment electric broiler. This broiler has an angle-iron frame and legs and is finished in black enamel. All walls are heavily insulated to conserve the heat. Each broiling compartment has two burners, one on each side, controlled by separate three-heat switches. By this arrangement both sides of the meat are broiled at one time. In the two and three compartment types two or three kinds of meat or fish—or both—can be broiled at once without an interchange of odors. The broilers are made in 5, 10 and 15-kw. sizes. The resistance wire used is a composition of 80 per cent nickel and 20 per cent chromium.

High-Speed Forced-Draft Fan

The B. F. Sturtevant Company, Hyde Park, Boston, Mass., has developed a fan especially for high-speed forced-draft work which, it is said, has a very high efficiency maintained over a wide range of volumes. Particular attention is called to the heavy supporting annular rings carrying the blades. These rings are always of one piece, cut from a solid sheet, thereby avoiding the weakness of an acetylene well or the inefficiency of a riveted joint. Two substantial cast semi-steel hubs are riveted to the center plate. These hubs are shaped to conform to the natural-flow lines of the entering air.

The shaft is a steel forging of liberal proportions ground to the exact size. The fan impeller on its own shaft is

HEAVY SUPPORTING ANNULAR RINGS CARRY THE BLADES

given a careful running balance, insuring satisfactory operation, it is said.

The housing is constructed of heavy steel plate securely braced by a rigid angle-iron frame. The scroll sheet is bolted to this frame in such a way that portions of it are readily removable for cleaning or inspection. The outlet is approximately square and provided with a suitable angle-iron frame for convenient connection to the discharge duct. The cut-off is from 3 in. (7.6 cm.) to 5 in. (12.7 cm.) from the impeller, according to the size of the fan and is formed by a sheet rounded to a smooth curve or large radius. The inlet pieces are conical and are bound with heavy steel half rounds to protect the extending cones from damage. These cones are readily removable from the side sheet, and through the openings left by their removal the impeller may be put in place or removed. Inside of the housing the inlet cones are provided with a groove formed of angle-irons in which runs a flange on the impeller, as indicated in the accompanying picture. This method of packing increases the fan efficiency and practically eliminates the annoying "blow-back" through the fan inlet, it is claimed.

Particular attention has been paid in the design of this fan to secure as quiet operation as may be possible with a high-speed fan. The comparatively large distance between the fan impeller and the cut-off, together with the shape of this cut-off, eliminates one of the most serious causes of noise. The number and proportions of blades and the angle at which they are placed has given a very quiet-running impeller. The inlet packing, by preventing the eddy which usually occurs at the inlet side, still further decreases the noise. Such noise as the instrument does make is of low pitch and not disagreeable.

Hair Dryer and Waver

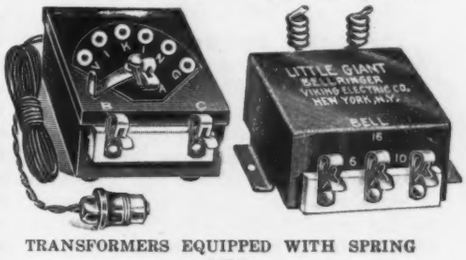
The Pelouze Manufacturing Company, 242 East Ohio Street, Chicago, has developed a combination curler and electrically heated comb. By slipping the comb attachment over the curling iron a heating effect is obtained, which, according to the manufacturer, has a tonic effect upon the hair and scalp. A special regulating device is included to prevent the temperature reaching a point that would burn the hair.

Bell-Ringing and Toy Transformers

The Viking Electric Company, 150 Chambers Street, New York City, has recently placed upon the market a line of bell-ringing and toy transformers, to be known as its "Little Giant" line.

With the three secondary voltages of 6-10-16, this bell ringer enables the electrician to determine readily the voltage that will overcome line losses and deliver the required voltages and current at the bell. The windings and core are embedded in a special insulating compound and contained within a sheet-iron case. The supporting ears are a part of the main case (not the transformer back), eliminating any danger to the transformer when being installed.

The primary cleat is provided on the inside with bosses through which the lead wires pass. The soldered joints



TRANSFORMERS EQUIPPED WITH SPRING CLIPS

are made on the other sides of these bosses. The secondary cleat is provided with recesses into which are set Fahnestock spring clips for terminals. These clips are riveted solidly through the cleat. This prevents the terminals from becoming loosened and causing loose connections.

Small Electric Radiator

Radiators in which the heating unit is a coiled wire suspended on supports in front of a highly polished reflector, shaped to reflect at different angles, have been developed by the Simplex Electric Heating Company of Cambridge, Mass. The appliance is 16½ in.

RADIATOR CONSUMES 600 WATTS

(42 cm.) long, 12 in. (30.5 cm.) high and 6½ in. (16.5 cm.) wide, and weighs 5.5 lb. (2.5 kg.). The casing is made of sheet metal and finished in black. The radiator is of the lamp-socket type and consumes 600 watts.

Washing Machine with Swinging Washer

An electric washing machine provided with a swinging wringer and known as the "No. 2" is being marketed by the Easiest Way Manufacturing Company of Sandusky, Ohio. This manufacturer calls attention to the fact that with this wringer the clothes may be turned from the washing machine to rinse water, from rinse water to bluing water, and from there to the basket, without moving the machine. One lever controls both wringer and washer. Both wringing and washing operations may be carried on at the same time. All gears and revolving mechanism are completely protected. A folding steel bench is supplied with this outfit without extra cost.

Rustproofing for Electrical Machines

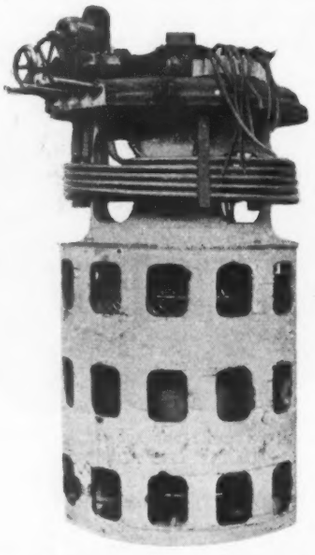
The Parker Rustproof Company of America owns basic American patents on a new rustproofing process that consists primarily of changing the surface of iron and steel articles to basic phosphates of iron. Ferrous and ferric phosphates are insoluble and stable in atmosphere, and if chemically bonded to the metal article, offer a protection that serves to keep it from rusting.

The articles to be "processed" are cleaned much the same as for electroplating. They are then immersed in a bath at 210 deg. or 212 deg. Fahr. (98.9 deg. or 100 deg. C.). This bath contains ferrous and ferric phosphates and some manganese dioxide. The article is left in the solution until hydrogen ceases to be liberated at its surface. The article is then removed from the bath, air-dried and finished with a heavy mineral oil or any other desired finish, such as japanning, painting, etc. The Parker company claims that articles finished in this fashion do not rust even though the japan or other covering should crack.

High-Voltage Feeder-Voltage Regulator

In the accompanying illustration is shown a high-voltage induction-type feeder-voltage regulator made by the Westinghouse Electric & Manufacturing Company of East Pittsburgh, Pa. This machine is rated at 160 kva., three-phase, 50 cycles, 11,000 volts, for 10 per cent regulation on 1600-kva., three-phase circuits. It is equipped with a motor and relays for full automatic operation.

This regulator has the same general mechanical designs as standard polyphase regulators for 2300 volts, special attention being given to coil insulation, in which mica is plentifully used. The coil ventilation is carefully worked out,



HIGH-VOLTAGE REGULATOR EQUIPPED WITH MOTOR AND RELAYS

and by the use of steel rings around the ends the coils are rigidly braced against magnetic shock from short circuits. When it is considered that the secondary windings are connected in series with the feeder circuit and must, therefore, receive all current or voltage surges on that circuit, the requirements for high-quality insulation and extra-strong bracing, properly applied, become apparent.

This unit is so constructed that the complete stator core and coils, as well as the rotor, may easily be removed from the tank for inspection and repairs. As an example of the extreme care taken in the design, the manufacturer cites the method of reducing vibration, with its resulting wear and noise, in case the bearings wear at one side, causing inequality in the air gap. To overcome this the windings are built with four coils per phase.

Electric Glue Pot

A dry-heat electric glue pot in which it is claimed that the consumption of electricity is kept down to a minimum because the insulation prevents loss of radiation and waste of energy has been placed on the market by the Mabey Electric & Manufacturing Company of Indianapolis, Ind. The heat-retaining jacket is constructed of heavy ingot iron, finished in black enamel with copper glue cup and wiping rod. Each glue pot is supplied with a 6-ft. (1.83-m.) cord, plug and a three-heat switch for 110 volts.

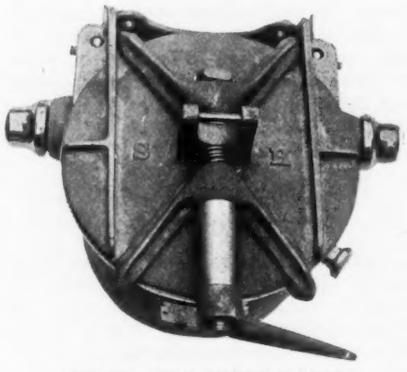
Oil Compression Subway and Overhead Cut-Out

A re-fusable cut-out embodying several improvements in electrical and mechanical arrangements is being manufactured by Schweitzer & Herz, 4327 Kenmore Avenue, Chicago. The Chem-electric Company, Chicago, and the G. & W. Electric Specialty Company, Chicago, are sole distributers.

The fusable link, which for its renewal requires no other tool than a screwdriver, and which, even in the largest size, costs less than 15 cents, is mounted between two blocks of refractory material held under compression. These blocks are suitably mounted on the removable plug member, which further carries contact plates for engagement with the clips mounted on the stationary member, where the line terminals are also installed. These parts are all held under oil in a case of metal capable of withstanding pressure.

In the operation of the cut-out the advantage of this construction is obvious in that the arc formed by the blowing of the fuse is quickly snuffed out if it ever does form. Usually the fuse is separated by the action of the compression blocks on softening; that is, just before the arc would otherwise form.

Each cut-out is equipped with a separable bracket, which is first



CUT-OUT HAS FUSABLE LINK

mounted on the cross-arm or in the manhole, after which the cut-out is slipped over the two projecting studs on the bracket.

This cut-out is for use on 2000-4000 volt circuits of currents from 10 amp. to 200 amp.

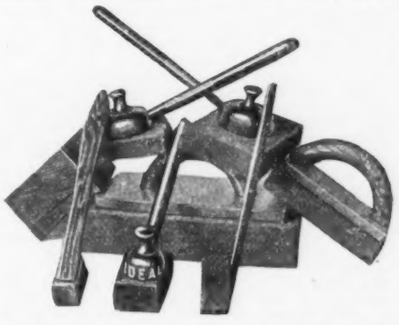
Control Equipment for Enameling Ovens

The standard form of control apparatus for enameling and japanning ovens and kindred work made by the Westinghouse Electric & Manufacturing Company of East Pittsburgh, Pa., consists of magnet switches or contactors mounted on slate bases, which in turn are mounted on a pipe frame. These are grouped in any number for the control of an oven of any size.

The magnet switches can be operated only by opening and closing the magnet circuit. This is accomplished in two general ways — hand control by push-buttons or automatically by means of a thermostat. The push-button station consists of a two-button station with "on" and "off" buttons. The thermostat control is accomplished by means of a control instrument designed to maintain automatically the temperature of the oven within certain limits. This instrument is of the pressure-gage type, the pressure being produced by the expansion and contraction of mercury or a gas in a steel capillary when subjected to heat. Instead of the gage reading pounds pressure, it is calibrated to read temperature. It may be set so as to maintain the temperature practically constant, continuously and entirely automatically throughout the operating period. With an increase in temperature to a predetermined value, the thermostat actuates a relay which in turn operates the magnet switches, causing them to open. As soon as the temperature decreases to a predetermined value, the thermostat again actuates the relay to cause the magnet switches to close.

Commutator Resurfacer

The Ideal Commutator Dresser Company, 812 Hartford Building, Chicago, is marketing a commutator resurfacer. This device consists essentially of an artificial stone attached to a convenient handle. The stone is applied to the commutator to be resurfaced, with the machine operating either idle or under load. The stone cuts down high



VARIOUS STANDARD TYPES OF RESURFACERS

mica ridges and bars and smooths out grooves and low spots, but does not collect the copper dust. The stones are made in a variety of sizes, the smallest standard size being 2 in. by 1 in. by 1 in. (5.08 cm. by 2.54 cm. by 2.54 cm.) and the largest standard size being 14 in. by 8 in. by 2 in. (35.6 cm. by 20.3 cm. by 5.08 cm.). Several different shapes with different styles of handles are shown in the illustration herewith.

Portable Vapor-Proof Lamp Guard

A safety vapor-proof portable lamp guard that is designed to meet the requirements of garages or places where gases or inflammable materials may be used is being made by the McGill Manufacturing Company, 22 Oak Street, Valparaiso, Ind. A heavy steel frame, strong handle, handy grip hook and vapor-proof receptacle are the features pointed out for this guard. This apparatus takes a 25-watt standard tungsten lamp and is heavily tinned.

Bell-Alarm Signal-Contact Attachments

Many operators desire to have a bell or other signal circuit closed by a manually operated circuit-breaker when it trips on overload so as to attract the

METHOD OF MOUNTING SIGNAL ATTACHMENT

attendant's attention. A bell-alarm signal-contact attachment is being made by the Westinghouse Electric & Manufacturing Company for accomplishing this purpose. The breaker can be tripped manually without actuating this attachment, which can be mounted directly on all automatic overload trip coverplates of manually operated panel-mounting or remote-control oil circuit breakers.

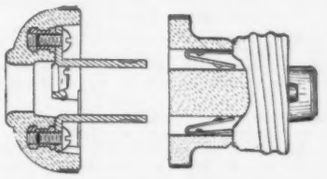
Solderless Connector

The Columbia Metal Box Company, 224 East 144th Street, New York City, is making a connector designed to be used as a substitute for soldered joints in junction boxes, conduit fittings, cleat wiring, in the bodies of lighting fixtures and behind shallow plates on ornamental wall brackets.

Fixtures can be removed at any time without cutting the wiring as in the case of soldered joints. This connector has been approved by the National Board of Fire Underwriters for a capacity of 17 amp. for fixture work, and for motor leads up to 4 hp.

Interchangeable Plugs and Receptacles

The Arrow Electric Company, Hartford, Conn., is manufacturing a complete and interchangeable line of "standard" plugs and receptacles. The attachment plug is separable. The



SPRINGS ARE REINFORCED

plug body is threaded for Edison base outlets and the plug cap acts as an adapter for thirteen different body parts.

All the springs in these plugs and receptacles are reinforced. The manufacturer points out that this insures a perfect contact, no matter how often the plug is inserted or withdrawn.

Electrically Operated Churns

A motor-driven churn is one of the new products of the Dazey Churn & Manufacturing Company, St. Louis, Mo. The motor is mounted on a framework above the churn proper and disconnected by a belt with a counter shaft at the base of the churn. A 1/6-hp. Morse motor is used for this outfit. A reduction pulley is used for speed adjustment, which enables the operator to set the speed at any desired value and to stop the churn without stopping the motor.

Electric Heaters for Small Rooms

The S. P. Stove Company, Inc., of Wilmette, Ill., has developed an electric heater for office, bedroom and bathroom use. This heater is made in a round or flat shape, the round one being shown herewith. The energy consump-

CONVENIENT ELECTRIC HEATER

tion is for either 660 watts or 1300 watts. The resistance unit is within the entire metal surface of the flat and round heater, so that both sides of the flat heater and the inside and outside of the round one are heated uniformly, it is claimed.

Trade Publications

CHAIN DRIVES.—"Casings for Link-Belt Silent Chain Drives" is the title of book No. 342, now being distributed by the Link-Belt Company of Chicago.

LAMPS.—The Westinghouse Lamp Company of New York has prepared a bulletin for agents and purchasers, giving engineering data about incandescent lamps.

CONCRETE MIXER. — The Blaw-Knox Company of Pittsburgh, Pa., is distributing a folder descriptive of its "Blaw-Ransomixer," in which its many advantages are pointed out.

ELECTRIC SUPPLIES.—The Mohawk Electrical Supply Company of Syracuse, N. Y., is distributing a bulletin in which it lists the lines of various manufactures which it is handling.

DISCONNECTING SWITCHES. — The Pringle Electric Manufacturing Company of Philadelphia has prepared bulletin No. 101, descriptive of its disconnecting switches equipped with locks.

GRAPHIC METERS.—The Esterline Company of Indianapolis, Ind., is distributing a bulletin descriptive of the largest graphic meter in the world for the largest station in the world.

AUTOMATIC SYSTEMS.—B. R. Schearer of Johnson City, Tenn., has prepared a leaflet descriptive of the Schearer automatic system for use in power plants and on electric-drive installations.

PORTABLE ELEVATORS.—The New York Revolving Portable Elevator Company of Jersey City, N. J., has prepared a booklet entitled "A Steel Giant," in which is described the method of installing overhead motors.

LOCOMOTIVES.—The heavy traction department of the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., is distributing reprint No. 58, descriptive of gears and side rods of electric locomotives on American railroads.

ELECTRIC HOISTS.—In book No. 246 the Link-Belt Company of Chicago describes its electric hoists. The book includes the leading features of the Link-Belt hoist, uses to which these hoists can be put, table of lifting capacities, direct-current and alternating-current hoists, etc.

OIL FUSE CUT-OUTS.—Oil fuse cut-outs for 2500 volts to 13,000 volts are illustrated and described in catalog No. 2, now being distributed by the D. & W. Fuse Company of Providence, R. I. This bulletin describes the pole type, subway type, and also heavy-service cut-outs for use up to 13,000 volts.

COMBINED FUSE AND SWITCH.—W. N. Matthews & Brother, Inc., St. Louis, Mo., has prepared a folder with suggestions for installing its type BF Matthews fuse switch. This company has also prepared a folder with directions for utilizing its hold-fast adjuster, a fixture that may be used in any position.

SYNCHRONOUS MOTORS.—The Electric Machinery Company of Minneapolis, Minn., has prepared bulletin No. 168, descriptive of its synchronous motors. This bulletin compares induction motors with synchronous motors. It describes how these motors are used in driving paper-mill machinery, rock crushers, rubber mills, fans and blowers and high-pressure pumps.

TURBINE PUMPS.—The Worthington Pump & Machinery Corporation of New York City has prepared a bulletin descriptive of the Worthington pump for high-pressure service. This bulletin describes the principle of operation, characteristics of turbine pumps, hydraulic balance, double volute pump, two-stage centrifugal pump, method of drive and field of application.

TROLLEY WIRE.—The Bridgeport Brass Company, of Bridgeport, Conn., is distributing bulletin No. 10, descriptive of its "Phono-electric" trolley wire. This bulletin gives the history of this wire, its characteristics, the reason why it is best for congested city traffic routes, on curves, general city use, suburban railways, interurban railways, heavy electrification, and other services. Photographs showing the busiest streets in the large cities of this country and others are given.

SYNCHRONOUS MOTORS.—The Westinghouse Electric & Manufacturing Company of East Pittsburgh, Pa., is distributing circular No. 1570, descriptive of synchronous motors for power-factor correction, by Nicholas Stahl. The fundamental principles underlying power factor and its control are discussed and establish for those not versed in technical calculation. A simple graphical solution for all the problems of power-factor correction likely to arise in ordinary practice is given. Illustrations show some of the installations in which Westinghouse condensers have successfully improved the operating conditions.

Trade Notes

THE CROCKER-WHEELER COMPANY, Ampere, N. J., is erecting a new five-story reinforced concrete manufacturing building, 100 ft. by 200 ft., at an approximate cost of $163,000.

W. D. SMITH, formerly connected with the New York office of the Robbins & Myers Company, has been elected secretary of the American Thermostat Company of New York City.

PHILIP K. CONDIT, formerly export manager of the Western Electric Company, has been appointed assistant director of the bureau of export licenses and placed in charge of the New York office at 11 Broadway.

THE DIEHL MANUFACTURING COMPANY, Elizabeth, N. J., has passed, through majority stock ownership, into the hands of F. S. Sells, recently of England. The Diehl company was formerly controlled by interests in Milwaukee.

THE ROBBINS & MYERS COMPANY has completed arrangements whereby the company will buy coffee in wholesale lots for retail to employees at cost price. The company announces that if the plan is successful similar activities will take place in other commodities.

WOODMANSEE & DAVIDSON, INC., Continental and Commercial Bank Building, Chicago, has changed its name to Woodmansee-Davidson Engineering Company. The address of the Milwaukee office has been changed from Wells Building to First National Bank Building.

FRANK L. PATTERSON & COMPANY and BENJ. F. KELLEY & SONS, water heating engineers and manufacturers of heaters, announce a combination of their interests under the name of the Patterson-Kelley Company, Inc., 26 Cortlandt Street, New York City.

C. D. POWELL of the general engineering department of the Westinghouse Electric & Manufacuring Company has resigned and accepted the position of manager of works of the Scientific Products Company of Steubenville, Ohio. The factory is at New Cumberland, W. Va.

THE CAPITAL ELECTRIC COMPANY has changed its name to the Geyser Electric Company, with offices at 321-323 North Shelton Street, Chicago. The company manufactures Geyser electric washers. The company announces no change beyond that of name has taken place.

THE ROBBINS & MYERS COMPANY of Springfield, Ohio, is making changes in its factory whereby space formerly utilized for storage will be taken up by new manufacturing departments. The new arrangements provide necessary space for further growth of existing departments.

JOHN H. BARKER announces the opening of an office at 95 Liberty Street, New York City, for the sale of electrical equipment for factories. Mr. Barker represents Roth Brothers & Company of Chicago, carrying a general line of motors and generators. Mr. Barker was connected with the Diehl Manufacturing Company for more than eight years as manager of its New York office, and as general sales manager.

THE ELECTRIC FURNACE CONSTRUCTION COMPANY, Philadelphia, Pa., announces that Frank W. Brooke, who was originally connected with the Gronwall Dixon furnace at Detroit and latterly as metallurgist for the Ludlam Steel Works and the Ludlam Electric Furnace Company, is joining its staff as director. Mr. Brooke will be responsible for the construction and running of the Greaves-Etchells furnaces. He will be assisted in the erection and installation by G. W. Ketter.

THE BRADFORD-ACKERMANN CORPORATION, Forty-second Street Building, New York City, announces that it has been appointed the Eastern sales agent for Young Brothers Company, Detroit, Mich. The sale of Young ovens for japanning and drying purposes will in the future be handled by this Eastern office for the New England States, New York, New Jersey, Maryland, Delaware and eastern Pennsylvania. An engineering department will likewise be available for manufacturers in the East who are interested in quick drying and baking processes, and special oven designs will be offered to meet various requirements.

New Incorporations

THE FULDA (Ind.) FUEL & LIGHT COMPANY has been incorporated with a capital stock of $2,100 by Alex. Snider and others.

THE LUCASVILLE (Ohio) LIGHT & POWER COMPANY has been incorporated with a capital stock of $2,500 by Austin Taylor and others.

THE CISCO (Ill.) ELECTRIC COMPANY has been chartered with a capital stock of $2,500 by W. S. Armsworth, E. Armsworth and E. Salisbury.

THE PHILO (Ill.) LIGHT, HEAT & POWER COMPANY has been incorporated with a capital stock of $5,000 by John B. Carson, Davis E. Godfrey and O. B. Carson.

THE JENNINGS (OKLA.) ICE & LIGHT COMPANY has been incorporated with a capital stock of $20,000 by C. H. McElroy and B. A. McFarland, both of Jennings, and B. Bailey of Okmulgee.

THE H. & H. ELECTRIC COMPANY of Mount Kisco, N. Y., has been incorporated with a capital stock of $1,000 by John C. Hansen, L. Hansen and H. Houlberg. The company proposes to do a general contracting business.

THE ALABAMA STORAGE BATTERY COMPANY of Birmingham, Ala., has been chartered with a capital stock of $6,000. The officers are: H. W. Matthews, president; Fred Sintes, vice-president, and C. R. Matthews, secretary and treasurer.

THE DAVIS ELECTRIC COMPANY, 54 Clinton Street, Newark, N. J., has been incorporated by C. E. Davis, R. Van Seggeren of Newark, and A. E. Davis of Irvington, N. J. The company is capitalized at $50,000 and proposes to deal in electrical goods.

THE EASTERN CONNECTICUT POWER COMPANY has filed a certificate of incorporation with the Secretary of State. The company is capitalized at $1,500,000 and proposes to generate and distribute electricity and to acquire electrical plants.

THE DELISSER ENGINEERING CORPORATION of New York, N. Y., has been chartered with a capital stock of $10,000 by M. and A. Delisser and J. C. L. Rogge, 50 Broad Street, New York, N. Y. The company proposes to do a general electrical engineering business.

THE GROTON (N. Y.) ELECTRIC POWER CORPORATION has been incorporated by J. B. Carey, O. E. Wasser and I. J. Magee, 622 West 113th Street, New York City. The company is capitalized at $20,000 and proposes to generate and distribute electricity for lamps, heaters and motors.

THE VAPOR HEATER CORPORATION has filed articles of incorporation under the laws of the State of Delaware with a capital stock of $1,000,000 to manufacture oil, vapor gas and electric heating devices of all kinds. The incorporators are: C. L. Rimlinger, W. S. Randall and C. M. Egner of Wilmington, Del.

THE LOESCHER TANNING COMPANY of Lee, Me., has been incorporated with a capital stock of $400,000 for the purpose of generating and distributing electricity in the town of Lee and the adjoining town of Springfield. The officers are: Harris N. Merrill of Winn, president; Harvey L. Haskell of Lee, treasurer, and M. L. Merrill of Winn, clerk.

THE ANIMATED BULLETIN COMPANY has filed articles of incorporation under the laws of the State of Delaware with a capital stock of $100,000 for the purpose of manufacturing electrical and other advertising devices. The incorporators are: Richard M. Craig of San Antonio, Tex.; Frank W. Arford and Charles A. Murphy of Chicago, Ill.

THE DEGNON AQUEDUCT CONSTRUCTION CORPORATION of Queens, N. Y., has been incorporated by R. P. Gustin, 68 Hunters Point Avenue, Queens, Long Island City; C. A. Baker and H. F. Karst, 52 Broadway, New York City. The company is capitalized at $25,000 and proposes to construct electric and other railways and do a general contracting business.

THE AUTOMATIC CONTROLLER & MANUFACTURING COMPANY of Ogden, Utah, has been incorporated with a capital stock of $100,000 to manufacture electrical and other machinery. The company will take over the patents granted to Cleveland Redfield. The officers are: Cleveland Redfield, president; J. W. O'Brien, vice-president; William J. Stone, secretary; Thomas Q. Whitehill, treasurer.

New England States

PRESQUE ISLE, ME.—The Gould Electric Company of Presque Isle has applied to the Public Utilities Commission for permission to issue 5993 shares of capital stock at $100 per share, the proceeds to be used for the purchase of the property of the Maine & New Brunswick Electrical Power Company.

WHITE RIVER JUNCTION, VT.—The Mascoma Electric Light & Power Company of White River Junction has changed its name to the Grafton County Electric Light & Power Company.

ADAMSDALE, MASS.—The Attleboro (Mass.) Steam & Electric Company has applied for permission to extend its electric transmission line from South Attleboro into Adamsdale to furnish electrical service to the residents in this village.

FALL RIVER, MASS.—The War Department has granted the petition of the Fall River Electric Light Company to erect its wires across the Taunton River to connect the local switchboard with the transmission system of the New England Power Company.

GREAT BARRINGTON, MASS.—The Great Barrington Electric Light Company is erecting a new electric transmission line from the Furnace power station to the mill of the Rising Paper Company, which has contracted for electrical service.

MELVILLE, R. I.—Bids will be received at the Bureau of Yards and Docks, Navy Department, Washington, D. C., until Oct. 8 for construction of two wood-frame double buildings, including plumbing, lighting and heating systems, at the United States naval coal depot, Melville station. Drawings and specifications (No. 2565) can be obtained on application to the above bureau or the commandant of the naval station, Narragansett Bay.

SHELTON, CONN. — Contract has been awarded by Sidney Blumenthal & Co. for the construction of a new boiler house, 27 ft. by 150 ft., at their plant to Thompson, Binger & Co., 280 Madison Avenue, New York, to cost about $35,000.

Middle Atlantic States

BINGHAMTON, N. Y.—Operations have begun at the new plant of the Binghamton Light, Heat & Power Company. The plant has taken over a portion of the load of the old plant, about 600 kw., and will carry the entire load upon completion of the new substation and the 30,000-volt transmission line now in course of construction. Foundations for the towers are nearly completed.

BROOKLYN, N. Y.—Bids will be received by the New York Municipal Railway Corporation, 85 Clinton Street, Brooklyn, until Oct. 8 for erection of third-rail and appurtenances on the Culver line. Plans and further information may be obtained at the office of the chief engineer, Room 602, 85 Clinton Street, Brooklyn, N. Y.

BUFFALO, N. Y.—The American Radiator Company is planning to install new Greaves-Etchells 6-ton electric furnaces at its plant.

BUFFALO, N. Y.—Plans have been filed by the Buffalo General Electric Company for the erection of an addition to its power plant on River Road.

CANASERAGA, N. Y.—The Canaseraga Heat, Light & Power Company has petitioned the Public Service Commission for permission to construct an electric plant in the village of Canaseraga and for authority to issue capital stock.

CANTON, N. Y.—The St. Lawrence Transmission Company of Potsdam has petitioned the Public Service Commission for permission to construct an electric plant and furnish electricity in part of the town of Canton and for approval of a franchise received from the town.

HORNELL, N. Y.—Preparations are being made by the Hornell Electric Company to replace the arc lamps now in use with high-candlepower incandescent lamps throughout the city, with the exception of the business section, where curb lamps will be used.

LA SALLE, N. Y.—The Village Council has contracted with the Niagara Falls (N. Y.) Gas & Electric Light Company to install and maintain 20 tungsten street lamps of 60 cp., north of the railroad tracks.

LITTLE FALLS N. Y.—The contract for electric-lighting fixtures in the new City Hall has been awarded to the Electric Shop & Garage, Inc., of Little Falls, at $4,675.

NEW YORK, N. Y.—Arrangements have been made by the Bronx International Exposition, Inc., for the construction of a new transformer department at its building on 177th Street.

NEW YORK, N. Y.—The Interborough Rapid Transit Company is contemplating the construction of a new transformer station on property recently acquired on Jerome Avenue, at a cost of about $26,000.

NEW YORK, N. Y.—The Interborough Rapid Transit Company, 165 Broadway, has acquired property at 113 East Eighteenth Street, adjoining its power plant, on which the company, it is understood, will build an extension.

PALMYRA, N. Y.—The clearing away of the remains of the old power plant at the barge canal locks has been completed and work of building the new structure, to stand west of where the old station was located, will begin at once. Not much can be done before next spring, but the preliminary work is under way. W. F. Maas & Son of Rochester are contractors.

ROCHESTER, N. Y.—Plans have been filed by George Keith, 155 Exchange Street, for the construction of a power house, 25 ft. by 48 ft., to cost about $10,000. Contract for construction has been awarded to A. F. Friederich & Sons Company, Lake Avenue, Rochester.

SLOATSBURG, N. Y.—The Ramapo Finishing Corporation has awarded contract for the construction of a power house, 75 ft. by 150 ft., one story, to J. M. Rooney, 65 Brookside Avenue, Nyack. Charles H. Tenney & Company, 201 Devonshire Street, Boston, Mass., are engineers.

BAYONNE, N. J.—Plans have been prepared by the Board of City Commissioners for the installation of an electric-lighting system in the Park House, City Park and West Fifteenth Street.

ESSEX FALLS, N. J.—The Borough Council has awarded the Public Service Electric Company a contract for lighting the streets of the borough for a period of five years.

GLOUCESTER, N. J.—The City Council has granted the Delaware & Atlantic Telegraph & Telephone Company a fifty-year franchise to install and operate underground and aerial lines in different sections of the city.

HASBROUCK HEIGHTS, N. J.—Plans have been filed by the New York Telephone Company of New York City for the erection of a two-story addition to the local exchange, to cost about $9,000. F. Milani of Hasbrouck Heights has the contract.

HOPEWELL, N. J.—The Public Service Electric Company has submitted a bid to the Borough Council for furnishing electricity to maintain the proposed improved street-lighting system.

JERSEY CITY, N. J.—The Board of Freeholders has awarded the Public Service Electric Company a contract for lighting the county institutions, roads and parks for a period of five years.

NEWARK, N. J.—Bids will be received by the Common Council until Oct. 2 for the installation of electric equipment in the proposed new fire house on Sanford Avenue. A. Archibald is City Clerk.

NEWTON, N. J.—Plans have been prepared by Andrew Kidd, Jr., engineer, 96 Liberty Street, New York City, for an addition to the power house, 50 ft. by 50 ft., one story, of the Sussex Print Works on Sparta Avenue.

PERTH AMBOY, N. J.—Plans are being considered by the J. C. Pardee Works for the installation of a new gas producer plant to replace the plant recently destroyed by fire. The company manufactures steel billets and bars.

PERTH AMBOY, N. J.—Plans are being considered by the Board of Aldermen for improvements to the commercial lighting system. A new generating unit and other equipment, it is reported, will be installed at the municipal lighting plant at once.

PLAINFIELD, N. J.—The Niles-Bement-Pond Company is planning to build a power house at the Pond works in Plainfield, estimates for which have been received.

TRENTON, N. J. — The Public Service Electric Company is considering extensive improvements to its system in Liberty Street, from Adeline Street to Olden Avenue.

TRENTON, N. J.—Preparations are being made by the Public Service Electric Company for improving the lighting system in Stockton Street. The company has recently completed the installation of a new underground conduit system.

BOYERTOWN, PA. — Arrangements are being made by the Boyertown Electric Company for improvements to its electric transmission lines from Boyertown to Bally.

ERIE, PA.—Contract has been awarded by the Union Iron Works, Cascade Street, for the construction of a new power house and boiler room, 58 ft. by 90 ft., to Constable Brothers, Fifth and Sassafras Streets, Erie, at a cost of about $15,000.

McKEE'S ROCKS, PA.—The Pittsburgh Railways Company is planning to erect a new substation at Island Avenue and Boquet Street.

PHILADELPHIA, PA.—The Pennsylvania Chemical Company is planning to erect a new engine room, 46 ft. by 48 ft., at its Washington Avenue plant, to cost about $20,000. Contract for construction of building has been awarded to the Nickson-Duggan Corporation, Bailey Building, Philadelphia.

PITTSBURGH, PA.—Extensive improvements, it is reported, are contemplated by the Pittsburgh, Mars & Butler Railway Company, to cost about $1,250,000.

READING, PA.—The Metropolitan Edison Electric Company has secured a contract from the Narrow Fabric Works to furnish energy to the amount of 150 hp. at its factory in Wyomissing. The power company is making improvements to its substation on Seventh Street, including the installation of a new booster set for voltage control and a 1500-kw. rotary converter, the latter to be used exclusively for railway service.

READING, PA.—The Reading Transit & Light Company, the United Traction Company, the Front & Fifth Street Railway Company, all of Reading; the Boyertown & Pottstown Railway Company, the Birdsboro Street Railway Company and the Reading & Womelsdorf Railway Company, all of which are connecting lines of the Reading & Transit Company, have been consolidated under the name of the Reading Transit & Light Company. The new company, through ownership or lease, will operate the street railway system in and about the cities of Lebanon and Reading, and extending from the latter to Philadelphia.

SCHUYLKILL HAVEN, PA.—The Town Council is considering improvements to the municipal electric-light plant, including the installation of a new boiler, involving an expenditure of between $4,000 and $5,000.

SUNBURY, PA.—The Borough Council has adopted a resolution to install a municipal electric-light plant.

FREDERICK, MD.—The Hagerstown & Frederick Railway Company is planning the erection of a 33,000,000-volt transmission line from Security to Waynesboro, via Smithburg and Ringgold, which will supply energy to the Chambersburg, Gettysburg & Waynesboro Railway. The Waynesboro Electric Light & Power Company will erect the line from Waynesboro to the state line, a short distance north of Ringgold, and the railway company will build the line from its plant to the Mason and Dixon line and connect with the Waynesboro line there. It is expected that the Waynesboro plant will close down soon after the transmission line is completed.

BLUEFIELD, W. VA.—The Norfolk & Western Railway Company has awarded a contract to the Union Switch & Signal Company of Swissvale for the necessary material for extension of the signaling system on its electrified division near Welch, Va.

FAIRMONT, W. VA.—Improvements to the municipal water-works system involving an expenditure of $40,000 within the next two years are under consideration by the water commission. The plans provide for increasing the supply to 6,000,000 gal. per 24 hours and construction of earth reservoir with concrete lining. Electrically driven, four-stage centrifugal pump and filtration system may be installed. Plans are not yet completed. Ira P. Smith is water commissioner.

RALEIGH, W. VA.—The Chesapeake & Ohio Railroad Company is contemplating the construction of a new power house, to cost about $20,000, at its local works. F. I. Cabell of Richmond, Va., is chief engineer.

GLENLYN, VA.—Contract has been awarded by the Appalachian Power Company of Bluefield, W. Va., for the construction of a steam-driven electric generating plant on New River, between the Virginian and the Norfolk & Western Railways, to C. W. Hancock & Son, Lynchburg. The proposed plant will have a generating capacity of 100,000 kw. The equipment will include an 18,750-kw. steam turbine, three 1200-hp. boilers, etc. The cost of the proposed plant is estimated at $1,000,000.

Construction

News of Projects, Plans, Bids and Contracts. Notes on Work Under Way

NORFOLK, VA.—The Virginia Railway & Power Company is planning to build a one-story brick and concrete substation, to cost about $2,500.

NORTON, VA.—Improvements are being made to the local power house of the Old Dominion Power Company, including the installation of additional boilers and other machinery, which will double the output of the plant.

PETERSBURG, VA.—The Petersburg & Appomattox Railway Company, which is building a line to Camp Lee is planning to extend the line through the camp to Prince George Court House.

RICHMOND, VA. — Contract has been awarded to P. G. White & Sons, Merchants' Bank Building, Richmond, for the construction of an addition to the municipal electric-light plant to cost about $10,000.

North Central States

BAY CITY, MICH.—Plans have been completed by the Kuhlman Electric Company for additions to its plant.

DETOUR, MICH.—The contract for construction of electric-light plant in Detour has been awarded to C. W. Needham of the Needham Electric Company of Escanaba, which will include the installation of street lamps and wiring a large number of business places and residences.

GRAND RAPIDS, MICH.—The Clipper Belt Lacer Company is constructing a power house, to cost about $8,000.

AKRON, OHIO.—The City Council has granted the Northern Ohio Traction & Light Company permission to build extensions to its lines in Akron.

AKRON, OHIO.—The Northern Ohio Traction Company is contemplating the erection of a high-tension transmission line from its power plant in Tuscarawas Street W. through the west park and thence to the transforming station of the Central Power Company at Waco. The company proposes to install two more stations of the same size at the plant in Tuscarawas Street W.

CINCINNATI, OHIO.—Preparations are being made by the National Lead Company, 659 Freeman Avenue, Cincinnati, for the construction of a new power plant, 100 ft. by 60 ft., on the site of a portion of the old plant.

CINCINNATI, OHIO.—Plans are being prepared by Stegner & Hughes, architects, for the construction of a power plant, 30 ft. by 58 ft., one story, for the Sayers & Scoville Company on the C., H. & D. Railroad, in the West End.

CLEVELAND, OHIO.—Bids will be received at the office of the commissioner of purchases and supplies, Cleveland, Ohio, until Oct. 3 for one power type coal crusher for the Division of Water. Specifications may be obtained at the office of the commissioner of water.

CLEVELAND, OHIO.—The Westinghouse Electric & Manufacturing Company, it is reported, will erect a malleable iron foundry, 160 ft. by 260 ft., in connection with its gray iron foundry. The proposed plant will be equipped with two air furnaces and other equipment, including annealing ovens and molding machines, none of which has been purchased. A second building, to be used as a machine shop, will also be erected.

COLUMBUS, OHIO.—Petitions are being circulated by the Municipal Utilities League of Columbus, Ohio, for the submission of a bond issue to the voters at the November election, the proceeds to be used for the construction of a municipal telephone plant, to cost about $300,000.

COLUMBUS, OHIO.—The contract for the construction of the power plant on the Ohio University campus has been awarded to E. H. Latham of Columbus, at about $85,000. M. P. Streets of Columbus has secured the contract for building the tunnel and stack. The cost of the plant complete is estimated at about $200,000. Plans are now being prepared for the erection of a Chemistry Building, which will also be erected on the college campus and will cost about $200,000. J. N. Bradford is architect.

ELYRIA, OHIO.—The capital stock of Elyria Telephone Company has been increased from $200,000 to $350 000.

GALION, OHIO.—The plant of the Galion (Ohio) Dynamic Motor Truck Company has been purchased by the Lakewood Engineering Company of Cleveland, which, it is understood, will use it for the manufacture of storage battery trucks and trailers, with a four-wheel steer and four-wheel drive. Plans, it is said, are being prepared for an extension to the plant.

SALEM, OHIO.—The Youngstown & Suburban Railway Company is remodeling a light plant which it recently purchased in Salem to furnish energy to operate its car line. Equipment is now being installed in the plant and substations.

TOLEDO, OHIO.—Henry L. Doherty & Company of New York, N. Y., it is reported, are considering the construction of an electric railway from Toledo, Ohio, to Fort Wayne, Ind., via Waterville, Grand Rapids, Napoleon, Defiance and other cities.

YOUNGSTOWN, OHIO.—Extensive improvements are contemplated by the Youngstown & Suburban Railway Company to its electric railway connecting Youngstown and Leetonia, and also the construction of a branch from Columbiana to East Palestine. The company is also considering the erection of a power plant at the southern extremity of its line and new substations along the railway. The construction of the proposed power plant will necessitate an enlargement of the substation at car barns and other changes and improvements.

HARRODSBURG, KY. — The pumping plant of the municipal water-works system, with the exception of boilers, was destroyed by fire on Sept. 13.

ORANGEVILLE, IND.—Plans are being considered for the construction of a dam across Lost River to develop power to operate an electric-light and power plant in Orangeville. Post office address, Orangeville, R. F. from Orleans.

CHICAGO, ILL.—The Western Electric Company is reported to be considering the construction of a new factory at 4537-39 West Twenty-second Street, Chicago, to cost about $30,000. Walter R. Kattelle is architect.

CHICAGO, ILL.—Meltreger & Company, 1718 Washburn Avenue, Chicago, Ill., it is reported, would like to receive prices on arc lamps, Cooper Hewitt lamps and flaming-arc lamps. The company is also in the market for arc machines, generators, transformers, belting and equipment for complete plants.

PERU, ILL.—The City Council has decided to install a new pumping engine and a small generator in the municipal water and light plant, to cost about $7,940.

GRAND RAPIDS, WIS.—The contract for the installation of an ornamental lighting system in Grand Rapids has been awarded to the Natick Electric Company at $8,049.

LAKE GENEVA, WIS.—The Water and Light Commission is planning to install electrically-operated pumping equipment at the waterworks station, to cost about $6,200. The equipment will consist of one deep-well pump, with a capacity of 700 gal. per minute, and two horizontal pumps of 500 gal. capacity per minute, to be equipped with electric motors.

MILWAUKEE, WIS.—The Park Board is contemplating installing lighting systems in Humboldt Kosciusko, Mitchell and Washington Parks similar to that in Lake Park. D. B. Starkey is president of Park Commissioners.

MILWAUKEE, WIS.—The Cutler-Hammer Manufacturing Company of Milwaukee, it is understood, will soon begin work on the construction of the second unit of its new plant at Twelfth Street and St. Paul Avenue, which will eventually cost about $1,250 000, and which provides for replacement of all buildings comprising the present plant. Each unit will be 50 ft. by 200 ft., seven stories and basement, of reinforced concrete. A. W. Berresford is vice-president and general manager.

SHAWANO WIS.—The DeLos Engineering & Construction Company of Prairie du Chien has been awarded the contract for additions and improvements to the municipal electric-light plant and waterworks system. The work will include the erection of a new power house, 66 ft. by 115 ft. New equipment, consisting of a new engine and generator and two electrically-driven pumps, will be installed this fall.

STATE SANATORIUM, MINN.—Bids will be received by the Minnesota State Board of Control, State Capitol Building, St. Paul, until Oct. 4 for complete installation of underground heating distribution system, heating systems for cottages and power plant equipment for the Minnesota State Sanatorium, State Sanatorium. Copies of plans and specifications may be seen at the Builders' Exchanges of St. Paul, Minneapolis and Duluth, the office of the State Board of Control and the office of the superintendent of the institution. Extra copies may be obtained at the office of Charles L. Pillsbury Company, engineers St. Paul and Minneapolis, upon deposit of $25.

WALKER, MINN.—Energy for operating the local system will be supplied from the steam plant at Akeley. M. D. Stoner and T. H. Crosswell who own and operate the Cuyanna Range Power Company, which supplies electrical service in Akeley, Deerwood, Pillager, Brainerd and other places in this part of the State, have been granted a 15-year franchise and will erect an electric transmission line to Walker to furnish electricity in Nevis, Akeley, Walker and other towns.

DES MOINES, IOWA.—Property owners on Sixth Avenue, from Grand Avenue to School Street, have petitioned the City Council to install electroliers. The petitioners agree to furnish the standards if the city will furnish electricity for the lamps as provided under the metropolitan lighting system ordinance.

DUBUQUE, IOWA.—The Board of County Supervisors has granted the Eastern Iowa Electric Company a franchise to erect electric transmission lines over the county roads to furnish electrical service in the towns of New Wine, Luxemburg and Holy Cross for a period of 20 years.

MARSHALLTOWN, IOWA. — The City Council has called a special election to be held Oct. 15 to submit the proposal to sell the municipal electric-light plant to the Iowa Railway & Light Company.

STRAWBERRY POINT, IOWA. — The Town Council has called an election to submit to the voters the proposal to sell the municipal electric-light and power plant for not less than $30,000 and granting to the purchaser a 25-year franchise to operate power plant and to distribute electricity generated outside of the town limits.

CREIGHTON, NEB. — The Nebraska Electric Company of Cedar Rapids, Iowa, it is reported, has purchased a small water-power at Creighton, which it proposes to develop at once.

DUNBAR, NEB.—At an election held recently the proposal to issue $7,000 in bonds for the installation of a municipal electric-light plant was carried.

ALDEN, KAN.—A committee has been appointed to make investigations relative to the installation of an electric-light plant in Alden.

BELOIT, KAN.—The City Council is considering a proposal submitted by the Concordia Electric Light Company to furnish electricity in Beloit.

KANSAS CITY, KAN.—The Kansas City Light & Power Company has announced that plans are under way for the construction of a large electric power plant, to cost when completed approximately $10,000,000. The initial cost will be about $4,000,000. The site is bounded by Scott Avenue, Euclid Avenue and Kansas City Southern Railway tracks and the Missouri River, in what is known as the East Bottoms. The main building will be 600 ft. long and 266 ft. wide, with a pump house separate. Contracts have been awarded to the General Electric Company of Schenectady, N. Y., for two 20,000-kw. turbines. Plans are being prepared by Sargent & Lundy of Chicago, Ill., consulting engineers, who will have supervision of the construction of the plant.

LURAY, KAN.—The City Council has recently purchased the local electric-light plant, owned by M. L. Bratton, to be owned and operated by the municipality. Extensions and improvements will be made to the plant, including the installation of a larger engine.

PROTECTION, KAN.—The local electric-light plant was destroyed by fire on Sept. 13, causing a loss of about $25,000. Bonds have been voted for a new plant.

RIVERTON, KAN.—The construction of a new substation and other improvements to its local system, it is reported, are under consideration by the Empire District Electric Company of Joplin, Mo. This is said to be the first step to make Baxter Springs the supply station for furnishing electricity for the mines south and southwest of the city. The company is replacing three old engines with new motors and a transformer is being installed to transform energy from the plant at Riverton to Baxter Springs.

Southern States

RALEIGH, N. C.—All water powers (five sites) of the Yadkin and Pedee Rivers between Badin, N. C., and Cheraw, S. C., have been acquired by the Carolina Power & Light Company. The five sites are irrespective of Blewetts Falls, already developed and furnishing energy in cities and towns in North and South Carolina. The company has acquired 27,000 hp. at a plant on Wateree River in South Carolina and is erecting an electric transmission system to connect with its present lines. The company furnishes electricity in Marion, Florence, Darlington, Mullens and other cities in eastern South Carolina, between North Carolina and Somerville as far as Cheraw. Steam plants are operated in these places. Many electrical installations, it is understood, are contemplated in connection with this project.

REIDSVILLE, N. C.—The Town Commissioners have accepted the proposal of the

Southern Public Utilities Company of Raleigh, subject to the approval of the voters, for the purchase of the municipal electric-light plant, at $30,000.

SPARTANBURG, S. C.—The South Carolina Light, Power & Railways Company is contemplating extending its system to Camp Wadsworth.

BRUNSWICK, GA.—Plans have been prepared by the United States Maritime Corporation for the construction of six shipways, large drydock, small drydock; 1800 ft. of dock for rigging, fitting and repairing vessel foundry, woodworking plant, steel fabricating mill, power house, machine shop, storage warehouse for materials, etc. Thomas Hampton, 502 Union Savings Bank Building, Washington, D. C., is vice-president.

CLARKESVILLE, GA.—The Council has awarded the Wofford Shoals Light & Power Company of Cornelia a contract for furnishing electricity in Clarkesville. The company has leased the equipment of the Georgia Railway & Power Company and will erect a transmission line from Clarkesville to connect with the line at Habersham Mills.

DUBLIN, GA.—Plans are being considered by local business men for extension to the ornamental lighting system.

CLEARWATER, FLA.—The Republic Real Estate & Construction Company is reported to be contemplating the construction of an electric-light plant in Clearwater. J. Bornstein is president.

PENSACOLA, FLA.—The Pensacola Fertilizer & Oil Company, recently incorporated with a capital stock of $250,000, is planning to establish a menhaden fishery plant, including facilities to manufacture fertilizer and oil. The company will erect a factory building, scrap shed and two commissary buildings. The equipment will include three engines, two 150-hp. boilers, four 12,500-gal. oil tanks, two water tanks, oil and water pumps, electric-light plant, dryers, menhaden fish-handling machinery, etc. C. H. Munger, 21 Spruce Street, New York, N. Y., is representative.

BIRMINGHAM, ALA.—Plans are being considered by the Birmingham Railway, Light & Power Company for double-tracking its line on Nineteenth Street.

BIRMINGHAM, ALA.—The McClary-Jemison Machinery Company of Birmingham, it is reported, would like to receive prices on a 200-kw. to 225-kw., 250-volt direct-current generator and engine, complete with switchboard.

MAGEE, MISS.—Preparations are being made for the installation of an electric-light plant, sewer-disposal and water-works systems at the Mississippi State Tuberculosis Sanatorium, for which, it is understood, bids will soon be asked. B. Price, Empire Building, Birmingham, Ala., is architect.

OZARK, ARK.—Improvements are contemplated by the Citizens' Service Company to its local plant involving an expenditure of about $150,000.

LAKE CHARLES, LA.—Preparations are being made for the installation of an electric-light and power plant at the Lake Charles aviation field, to cost about $100,000. Electricity for operating the system will be supplied by the Lake Charles Railway, Light & Water Works Company, which will erect a 13,000-volt transmission line to the camp, 13 miles distant.

NEW ORLEANS, LA.—Bids will be received at the Bureau of Yards and Docks, Navy Department, Washington, D. C., until Oct. 8 for furnishing and installing one 10-ton bridge crane in the pattern and machine shop at the naval station at New Orleans. Specifications (No. 2541) may be obtained at the above bureau or from the commandant of the naval station named.

BLACKWELL, OKLA.—The municipal electric-light plant was recently struck by lightning. A new engine was wrecked, causing a loss of about $15,000.

MIAMI, OKLA.—An election will be called to submit to the voters the proposal to issue $45 000 in bonds for improvements and extensions to the municipal electric-light plant and water-works system.

DALLAS, TEX.—A 200-hp. engine is being installed in the court house power plant, at a cost of about $14,000. The power plant will furnish electricity for lamps and motors for the court house and jail buildings and for lighting the Oak Cliff viaduct and the Commerce Street bridge.

DALLAS, TEX.—The Dallas Southwestern Traction Company has been granted a franchise by the Commissioners' Court to build an interurban electric railway between Dallas and Irving. The proposed railway will eventually be extended to Cleburne, a distance of 60 miles. Contract for construction of the road has been awarded to the Creek Construction Company of Supula, Okla.

Pacific and Mountain States

ARLINGTON, WASH.—Work will begin immediately by the Washington Coast Utilities Company to rebuild its steam-driven power plant in Arlingtos, which was recently destroyed by fire. The new plant will be erected on the site of the old station.

ANACORTES, WASH.—A petition signed by taxpayers, merchants and manufacturers has been presented to the City Council asking that steps be taken immediately to have the street-lighting service resumed on the basis as it existed at the time of its discontinuance in October, 1916.

INDEX, WASH.—Bids will be received by R. W. Wilcox, Town Clerk, Index, until Oct. 1 for furnishing electrical equipment for a hydro-electric plant, as follows: One 100-kva. 2400-volt alternator, one 3-kw. 125-volt exciter, one switchboard and one automatic voltage regulator. Specifications may be obtained from G. N. Miller & Son, 531 Burke Building, Seattle, Wash., engineers. The Council has awarded contract for waterwheel to the United Iron Works of Oakland, Cal., for $1,110.

SEATTLE, WASH.—The Council has passed the ordinance authorizing an issue of bonds for the purchase of the Loyal Heights line, owned by Harry W. Treat, in Ballard, or the paralleling of that line. The engineering department has estimated the cost of extending the city's Division A from its present terminus at Thirteenth Avenue West and Thorndike Avenue across Ballard Bridge to Leary Avenue and Market Street at $28,542. For this extension the Council has authorized a loan of $25,000 from the light fund. The cost of the extension from Market Street and Leary Avenue north to the city limits, along the streets occupied by the Loyal Heights line, is estimated at about $100,000.

SKYKOMISH, WASH.—Plans are being prepared by G. N. Miller & Son, 531 Burke Building, Seattle, for the construction of a municipal electric-light plant in Skykomish, to cost about $7,000.

ASTORIA, ORE.—The question of extending the street car line to the McEachern Ship Company's yards and to the plant of the Astoria Pulp & Paper Company, at a cost of about $20,000, is under consideration.

BARSTOW, CAL.—Work will begin at once by the Southern Sierras Power Company on the erection of a new electric transmission line west from Barstow, a distance of 41 miles, at a cost of about $115,000.

BAY POINT, CAL.—Preparations, it is reported, are being made by the Pacific Electric Metals Company for the construction of an electric smelter in Bay Point. C. D. Clark of Stockton is president of the company.

HORNBROOK, CAL.—The Hazel Mining Company, which formerly operated the Gladstone Mine at French Gulch, has arranged for development of a group of gold properties in the vicinity of Hornbrook. Electric power equipment is to be installed at once. I. O. Jillson of Redding is reported interested.

LIVINGSTON, CAL.—An election will be held to vote on the proposal to form a lighting district in Livingston.

LOS ANGELES, CAL.—An extension from Redlands to Yucaipa, a distance of 13 miles, is under consideration by the Pacific Electric Railway Company.

LOS ANGELES, CAL.—In a decision handed down by the State Supreme Court the city of Los Angeles has won its contest for exclusive power rights in the Owens River project reversing the lower court, which had granted these rights to the Silver Lake Power & Irrigation Company.

SAN DIEGO, CAL.—The San Diego Consolidated Gas & Electric Company has applied to the State Railroad Commission for permission to issue $1,000.000 in bonds. The company announces an expenditure of $687,000 this year, of which $284.000 will be used for the extension of its electric transmission lines to San Juan Capistrano to connect with the hydroelectric power line of the Southern California Edison Company of Los Angeles.

SEBASTOPOL, CAL.—Plans have been presented to the Board of Trustees by the Pacific Gas & Electric Company for remodeling the local street-lighting system.

BLACKFOOT, IDAHO.—The City Council has entered into a new contract with the Idaho Power Company for new street-lighting service, which will greatly increase the street illumination.

SILVER CITY, IDAHO.—The Idaho Power Company of Boise, it is reported, contemplates an extension of its electric transmission lines to the Deming Mines. Surveys, it is understood, will begin at once and construction work will begin as soon as possible.

BUTTE, MONT.—The City Council has adopted a resolution declaring its intention of creating a special improvement district, No. 247, for the installation of an electric-lighting system, consisting of 75 lamp standards, on Montana Street, from Galena Street to Second Street, to cost about $7,984.

Canada

PRINCETON, B. C.—The Canada Copper Company is planning to open up a large mine near Princeton. Electricity to operate the mine will be supplied by the West Kootenay Power & Light Company. Copper and other products will be smelted and refined by the Consolidated Mining & Smelting Company at Trail.

WINNIPEG, MAN.—Tenders will be received at the office of M. Peterson, secretary of board of control, Winnipeg, until Oct. 3 for furnishing at Lac du Bonnet cast-iron pipe and specials, valves and accessories, vitrified clay pipe and cable clips. Specifications may be obtained at the office of the City Light and Power Department, 54 King Street, Winnipeg.

ANNAPOLIS, ROYAL, N. S.—Plans have been submitted to the Town Council by Booker & McKechnie, Davidson Building, Halifax, for the construction of a dam at Grand Lake; spillway, 100 ft. long and 25 ft. deep.

AMHERTSBURG, ONT.—The Brunner Mond Company, which is building a power plant in Amherstburg, at a cost of $250,000, is planning to erect a power house at Canard River.

BLENHEIM, ONT.—The Town Council has decided to dispose of the old power house and contents.

BRADFORD, ONT.—At an election to be held Oct. 6 a by-law authorizing the sale of $15,600 in debentures for the installation of a distributing system for hydroelectric power will be submitted to the ratepayers.

DUNDAS, ONT.—The Niles-Bement-Pond Company, it is reported, has awarded contract for an addition, 75 ft. by 450 ft., to its local plant. The cost is estimated at about $250,000.

JORDAN HARBOR, ONT.—The general contract for construction of power house for the Provincial Government Department of Public Works has been awarded to the Toms Contracting Company, Kent Building, Toronto.

LONDON, ONT.—Bids are being received by the London Art Woodwork Company for the construction of a factory and boiler house, to cost about $15,000. Watt & Blackwell, Bank of Toronto Building, are architects.

NEW TORONTO, ONT.—The Power and Water Commission has approved the plans of the Hydro-Electric Commission in changing the distribution system so that the township and New Toronto would each have a separate substation.

STRATFORD, ONT.—Work will soon begin on the installation of equipment in the substation of the Hydro-Electric Commission in Stratford.

BEDFORD, QUE.—The Bedford Electric Light Company is reported to be planning the construction of a dam across Pike River. The work, it is said, will be done by day labor.

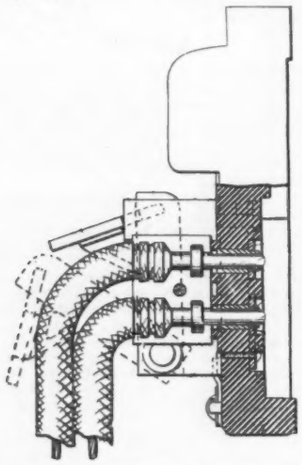
Miscellaneous

PANAMA.—Bids will be received at the office of the general purchasing officer, the Panama Canal, Washington, D. C., until Oct. 6 for furnishing sheet copper, sheet lead, hose clamps, gongs, pulleys, post-hole diggers, cable clips, range boilers, etc. Blanks and information relating to this circular (No. 1171) may be obtained at the above office or the offices of the assistant purchasing agents, 24 State Street, New York, N. Y; Audubon Building, New Orleans, La., and Fort Mason, San Francisco, Cal.

PANAMA.—Bids will be received at the office of the general purchasing officer, the Panama Canal, Washington, D.C., until Oct. 11 for furnishing boiler tubes, bronze, sheet copper, sheet brass, copper tubing, brass tubing, electric cable and wire, Monel metal, steam capstan windlass, steering engine, steering stand, gypsy switchboard, transformers, electric attachments and fixtures, etc. Blanks and further information relating to this circular (No. 1170) may be obtained from the above office or from the offices of the assistant purchasing agents 24 State Street, New York, N. Y.; Audubon Building, New Orleans, La., and Fort Mason, San Francisco, Cal.

1,240,176. Automobile Indicator; Horace Claude, Clarkstown, Ontario, and Ovila Lacombe, Ottawa, Ontario, Canada. App. filed June 22, 1916. Improvements.

1,240,184. Electric Railroad; Thomas M. Erickson, Chicago, Ill. App. filed Nov. 13, 1916. Relates to means controlled by the operator of a car for throwing a switch in such a railroad so that the car will run in either direction at the will of the operator.



1,240,363—Meter-Testing-Switch Construction

1,240,186. Spring Terminal Connection; Ernest B. Fahnestock, Brooklyn, N. Y. App. filed Feb. 24, 1913. For use more especially in connecting a high-tension cable to the post of a spark plug on the combustion engine of a motor vehicle.

1,240,188. Electrical Conduit Bushing; Charles W. Finley, Battle Creek, Mich. App. filed March 6, 1916. Improved means for closing the conduit with a removable cap.

1,240,206. Oscillation Generator; Raymond A. Heising, East Orange, N. J. App. filed Oct. 12, 1915. Makes use of a mechanical contact-making means whereby power is supplied to an oscillating circuit by means of a high-voltage direct-current generator at those times during the cycle at which the difference of the voltage between the generator terminals and that across the oscillation circuit is small.

1,240,239. Battery Case; Marcus H. Moffett, Lakewood, Ohio. App. filed March 23, 1914. Shipping case which is adapted to be used as a holder for the battery during use.

1,240,280. Storage Battery; David H. Wilson, Paterson, N. J. App. filed Feb. 3, 1917. Better distribution of a current of heavy amperage over the surfaces of a battery plate having low-resistance leading-in conductors.

1,240,294. System for Generating High-Frequency Currents; Riccardo Arno, Milan, Italy. App. filed Jan. 26, 1914. Improvements.

1,240,309. Switch; George C. Carhart and Stephen L. Young, Syracuse, N. Y. App. filed March 8, 1917. For controlling automobile or gas-engine ignition.

1,240,314. Oil Switch; Herbert W. Cheney, Milwaukee, Wis. App. filed Sept. 16, 1910. Can be safely employed in circuits of exceedingly high voltages and large amperages without any danger of the arcs causing injury to the operator or to any of the apparatus.

1,240,328. Method and Apparatus for Locating Ore Bodies; Reginald A. Fessenden, Brookline, Mass. App. filed Jan. 15, 1917. Improvement.

1,240,330. Insulator and Support Therefor; Louis Fort, Jersey City, N. J. App. filed Feb. 16, 1912. Provides a separable insulating member which may be utilized with a separable bracket member, giving great facility for applying and adjusting the device to the conductor.

1,240,348. Engine Starting Device; Charles F. Kettering, Dayton, Ohio. App. filed Sept. 19, 1912. Improvements.

1,240,363. Meter-Testing-Switch Construction; Clarence D. Platt, Bridgeport, Conn. App. filed Dec. 4, 1916. Meter-connecting plugs may be inserted into the switch-base sockets before opening the circuit through the switch and without disturbing the electrical condition in the branch line.

Record of Electrical Patents

Notes on United States Patents issued on September 18, 1917

1,240,364. Inclosed Switch Construction; Clarence D. Platt, Bridgeport, Conn. App. filed March 3, 1917. Fuses may be inserted and replaced by the householder or ordinary user without the possibility of contact with the switch mechanism.

1,240,380. Traffic-Direction Signal for Vehicles; Charles A. Singer, St. Louis, Mo. App. filed Sept. 27, 1915. Improvement.

1,240,410. Electrical Massage Apparatus; Theodore Bollin, Okmulgee, Okla. App. filed April 25, 1916. Improvements.

1,240,431. Filling Valve; Lewis S. Evans, Pittsburgh, Pa. App. filed April 1, 1914. Relates to valve mechanism for filling measured quantities of fluid or semi-fluid materials into containers.

1,240,442. Circuit Breaker; William S. Harley, Milwaukee, Wis. App. filed May 18, 1914. Pneumatic means for breaking an electric circuit.

1,240,448. Implement for Winding Armatures; William T. Hensley, Round Brook, N. J. App. filed May 24, 1912. Capable of winding on several wires at a time, and means are provided for feeding the said wires and keeping them from becoming tangled or disarranged.

1,240,449. Electrically Heated Valve; Claude J. Hinshaw and Roy L. Gable, Shelbyville, Ind. App. filed April 12, 1917. For internal combustion engines.

1,240,457. Electric Resistance Device; William H. Keller, Norton, Va. App. filed June 2, 1915. Reflexed portions of the grid are all of the same length.

1,240,458. Signal Lamp; Harold S. Kittredge, Chicago, Ill. App. filed June 4, 1915. Motor vehicles.

1,240,459. Electric Switch; Charles J. Klein, Milwaukee, Wis. App. filed June 12, 1911. Provides improved means for attaching the switch to a support.

1,240,460. Electric Furnace; David R. Knapp, Pottsville, Pa. App. filed Feb. 19, 1916. Bottom and walls may be repaired without completely discharging the liquid metal.

1,240,471. Electromagnetic Device; Daniel D. Miller, New York, N. Y. App. filed March 4, 1915. Relay which will be slow both in responding and in releasing.

1,240,490. Composition Containing Alumina and Zirconia; Lewis E. Saunders and Ray H. White, Niagara Falls, N. Y. App. filed Feb. 12, 1917. Also useful as a refractory.

1,240,491. Aluminous Abrasive and Method of Preparing the Same; Lewis E. Saunders and Ray H. White, Niagara Falls, N. Y. App. filed Feb. 12, 1917. Methods of making such abrasives.

1,240,574. Current Jack for Electrical Meters; Frank R. Innes, Detroit, Mich. App. filed Sept. 18, 1915. Improvement.

1,240,584. Articulated Metal Shell for an Electric Hot Pad; Henry D. Laraway and Bjarne Falkenberg, Ontario, Cal. App. filed Sept. 6, 1916. Entirely inclosed in an articulated metal shell which can be bent into various curvatures so that it can be applied to various portions of the body.

1,240,585. Brush Mounting for Electric Motors or Generators; Thomas L. Lee, Rochester, N. Y. App. filed April 10, 1916. Particularly for use in an electric motor or generator of the inclosed type.

1,240,590. Governor for Regulating the Overcharge for Storage Batteries; Perry Okey, Columbus, Ohio. App. filed Oct. 11, 1916. Combination of a generator and storage battery with an ampere-hour meter, which latter co-operates with a structure whereby the battery is periodically given an overcharge although the ampere-hour meter registers merely a full charge.

1,240,623. Motor-Control System; Carl P. Taylor, Roanoke, Va. App. filed Nov. 21, 1913. Motor will be dynamically braked without carrying the braking current through the commutator.

1,240,628. Arc-Light Electrode; Knut Tornberg, Lynn, Mass. App. filed March 13, 1916. To operate with direct current as lower cathodes in conjunction with non-consuming upper anodes.

1,240,637. Advertising Kiosk; George W. Williamson, Petaluma, Cal. App. filed Feb. 24, 1917. Electrically controlled changeable exhibitors.

1,240,647. Electrical Signal; Edward Balbach, Springfield, Ohio. App filed Sept. 21, 1916. On automobiles.

1,240,700. Incandescent Tungsten Lamp; Ernest Friederich, Berlin, Germany. App. filed June 11, 1913. Blackening of the bulb wall is prevented by means of a gaseous atmosphere.

1,240,707. Electric Lighting for Gas Stoves; Frederick C. Gutenberger, Sacramento, Cal. Improvements.

1,240,710. Power-Factor Meter; Chester I. Hall, Fort Wayne, Ind. App. filed Dec. 5, 1914. Curve drawing.

1,240,711. Talking Machine; Chester I. Hall, Fort Wayne, Ind. App. filed May 15, 1915. Comprises a rotatable circular member for supporting a disk record and an electric motor so arranged that its driving force is applied to the outer periphery of the member.

1,240,721. Auxiliary Spark Gap; Frank F. Hultgreen, Berkeley, Cal. App. filed Nov. 1, 1915. Provides a small, compact, neat device which is readily attached to existing spark plugs.

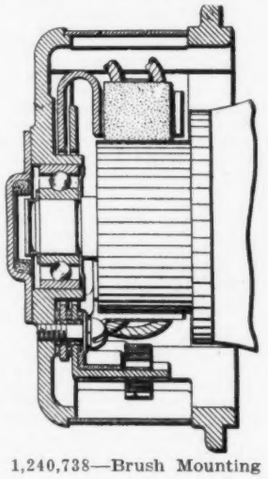
1,240,723. Time-Limit Relay; Ernest H. Jacobs, Schenectady, N. Y. App. filed Aug. 22, 1914. Improvements.

1,240,725. Engine Appliance; John W. Jepson, Depew, N. Y. App. filed Aug. 13, 1912. Engine may be easily started with the employment of a minimum amount of energy.

1,240,726. Engine Starting Arrangement; John W. Jepson, Depew, N. Y. App. filed Feb. 25, 1913. By means of an electric motor of minimum size, yet which will produce the necessary torque at starting and still be capable of operating at sufficient speed to start the engine effectively in all cases.

1,240,738. Brush Mounting; Earle P. Lee and Thomas L. Lee, Rochester, N. Y. App. filed Aug. 14, 1916. Relates to means by which the brushes of an electric motor or generator are guided and supported in engagement with the commutator.

1,240,770. Electric Light Apparatus; Nicola Papa, Utica, N. Y. App. filed March 14, 1916. Improvements.



1,240,738—Brush Mounting

1,240,771. Electric Heating Unit; Leon F. Parkhurst, Pittsfield, Mass. App. filed March 28, 1916. Improvements.

1,240,772. Vapor-Electric Device; Harry F. Perkins, Schenectady, N. Y. App. filed April 14, 1915. Particularly applicable to metal-walled, high-powered mercury-arc rectifiers.

1,240,795. Fuse Device; Edmund O. Schweitzer, Chicago, Ill. App. filed Nov. 3, 1913. Especially fuse devices for extra-high-potential work.